Historic, Archive Document

Do not assume content reflects current
scientific knowledge, policies, or practices.

13 titles
4,300 copies

SOIL conservation

U. S. Department of Agriculture/Soil Conservation Service/August 1973

39
1



Meeting the needs of educators

Even though it may appear to some that environmental and conservation education programs are ". . . riding madly off in all directions," they continue to grow in numbers, and there are many signs that point to common goals down the road.

Several points of emphasis now mentioned most frequently by educators are relevant to the kinds of help conservation district leaders and SCS can provide for environmental education efforts, particularly in the development of outdoor classrooms where student learning experiences are based on actual projects in resource management.

There is a growing recognition among teachers, reflecting the influence of two eminent educators, Jean Piaget and Jerome Bruner, that children need to learn by doing, especially during the years when they are developing the ability to measure, test, and make meaningful observations.

The "hands-on" experiences in the outdoor classroom are prime examples of learning by doing. Outdoor classroom experiences are one of the ways in which students today can translate textbook studies in conservation into real-life situations where they can observe and evaluate the effects of resource management in relation to specific projects.

Also frequently mentioned by teachers is the enthusiasm displayed when students have a part in planning their projects, are allowed to weigh alternative courses of action, and have a chance to evaluate both the short-term and long-range consequences of their decisions.

SCS help for outdoor classroom development begins with a conservation plan for the site, based on a resource inventory. By sharing these early planning stages with teachers and students, the conservationist can emphasize the need for land-use and resource planning to identify problems and establish realistic goals in environmental improvement.

Flexibility and imagination are essential to conservationists who work with young people. The curiosity of children can far outrun the ability of adults to answer in detail every question from every student, but in the discussions that take place during project work, there are many opportunities to motivate further study and action by the class.

In outdoor classroom studies, for example, it is easy to tack a "Northern Red Oak (*Quercus rubra*)" plastic label on a tree. It is something else to help students project a single red oak tree into a broad frame of reference—to an understanding of how soil and climate at this particular location have created an environment favorable to red oaks. Further inquiry can stimulate an interest in the kinds of plants and animals that share the environment with the oak.

Once begun, the process of moving from a single observation to a cluster of related understandings can bring together many fields of interest—science, history, social studies, and creative arts.

School site projects enable conservationists to emphasize the multidisciplinary background necessary to the protection and management of resources through conservation practices. Biology, soil science, hydrology, and agronomy all fit together in the development of a conservation plan for environmental improvement in either a rural or urban situation.

As more schools each year look to district leaders and to SCS for help in developing outdoor classrooms and conservation learning areas, it becomes evident that many teachers have common goals in environmental education. Chief among these is the broad objective of preparing students to assume responsibility for and to carry on the action that will be necessary to environmental improvement.

Much will be demanded of these youngsters who are today learning how to run a simple pH test, how to use a shovel and rake to shape and seed an eroding area, and how to recognize environmental problems and where to seek some of the solutions.

SCS has, from the beginning recognized the importance of conservation understandings as an integral part of the total school program. In order for conservation to become a way of life for young people by the time they are in decision-making roles in their community, SCS must give a high priority to helping schools meet their goals in conservation education.

Kenneth E. Grant

SOIL conservation

August 1973, Vol. 39, No. 1

Contents

2 From the Administrator

4 Conservation education—it lasts a lifetime
by Neal Munch

6 Conservation—a plan for all seasons
by Kay Mergen

8 "Education that cannot wait"
by Dr. Clyde W. Hibbs

10 Changing the face of school sites
by Jerry Schwien

12 Outdoor classroom helps revive Indian traditions
by Rose Fleming

14 Environmental education: homebrew style
by Dr. Wilson F. Clark

16 Through an open door
by Helen Patterson

18 Experiences unlimited
by Joe E. Wright

20 A community approach to outdoor classrooms
by Claude Crowley

23 Review

23 Meetings

COVER: Sometimes expert help from a resource person like Emmett Tynes, SCS district conservationist, makes understanding soil texture a little easier. (See p. 12)

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

EARL L. BUTZ, Secretary of Agriculture.

KENNETH E. GRANT, Administrator, Soil Conservation Service

PHILLIP A. CHAVEZ, Editor

MARYELLEN BERTRAM, Editorial Assistant

SOIL CONSERVATION, the official magazine of the Soil Conservation Service, is published monthly by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. Use of funds for printing this publication approved by the Director of the Office of Management and Budget, July 17, 1973.

Reprint permission: Contents of this magazine may be reprinted without permission. Credit is not required but is appreciated. Photographs are available on request.

Commercial names: Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscription: $3.50 per year, $4.50 foreign. Single copy, 45 cents. Discount of 25 percent on orders of 100 or more sent to same address. Order direct from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Conservation education —it lasts a lifetime

by Neal Munch
District conservationist, SCS
Freehold, New Jersey

Do the things children learn in an outdoor classroom really stick with them as adults? Do they influence their attitudes toward the environment in later years?

It has been 10 years since a group of children helped develop the first outdoor classroom in Freehold, New Jersey, and I recently queried those pioneer students about their recollection of the experience.

They are grown now and scattered in all directions—in graduate school, working, or married and living far from Freehold.

The small courtyard at Intermediate School, surrounded on three sides by classrooms and walls, was transformed 10 years ago into a miniature replica of New Jersey's various land forms, complete with native vegetation.

This outdoor classroom has been in continuous use since that time by hundreds of students who have learned how natural resources are interrelated and how people can care for and improve their environment.

Eric Levin, now a graduate student in sociology, has vivid memories of the project. "That was my first exposure to conservation as a science," he said. "For me, the nature area was a starting point of interest in conservation and the environment. I believe that the younger a student can start these kinds of studies, the better."

Among the most perceptive comments were those that came in a letter from David Garrison. After giving credit to Harold Smith, the teacher whose enthusiasm and dedication gave leadership to the original project, Garrison wrote, "The land has become a terribly important part of my life, and no matter what direction my adult career may take I know that I shall never lose my love for the land.

"It always saddens me to realize how shallow some Americans can be in their treatment of the land when at the same time we claim to be an example to all others. I believe . . . it is possible for children (through the use of an outdoor classroom) not only to gain knowledge of the natural world around them but also to gain a real understanding of the personal values needed to live meaningfully and responsibly in that world."

Another student, Cathy Spalholz, now married and living in western Pennsylvania, is using what she learned in her conservation studies to turn her backyard into a nature area. She remembers the trips to gather native plants for the school courtyard and how she and other students waited anxiously for their plants to grow.

One young man remembered that he helped dig the pond. He said that the nature area helped him gain an understanding of New Jersey and its natural resources. Jim Zarnowski also added, "I was a Boy Scout then, and the nature area helped me earn my merit badges."

Stephen Shutzer, a mechanic, commented on the experience of sharing interests and labor with his classmates. "Everyone knew," he wrote, "that it was not a one-person project but that we all had to make it a success. We did it with fun and enthusiasm, and it was one of the few times I did not mind staying after school."

Stephen's younger sister, Cindy, is now making use of the nature area he helped develop. She is one of Mrs. Peggy Dillinger's second grade students.

Mrs. Dillinger encourages the second graders to make use of all their senses. They identify bird calls, walk barefoot on the grass to feel the texture and temperature, smell bayberry leaves, and collect berries, leaves, and ferns which they later use in developing a booklet that helps them identify shapes, colors, and sizes.

The children have become sensitive to other creatures in the environment. When a bullfrog was discovered away from the pond one bitter cold day, the children covered him with grass, hoping to help him survive.

The comments made by the members of that first class seemed to me to show that the students remembered most clearly what they had done with their hands, that it was fun, and that outdoor projects can be the start of a lifelong interest in conservation.

Enthusiastic and dedicated teachers, like Harold Smith and Peggy Dillinger, are the key to a successful outdoor classroom program. And the easy accessibility of the outdoor classroom proved its worth for the opportunities it offered for continuing and day-to-day studies.



(Left) Members of the class that developed the first outdoor classroom in Freehold, New Jersey, 10 years ago. The white pine is representative of native New Jersey plants used in the classroom to help students learn about the state's natural resources.
(Center, left) More members of the "pioneer" class working on a project, and (center, right) 10 years later, Mrs. Peggy Dillinger and some of her students studying pond life in winter at exactly the same place.
(Bottom) Ten years ago, the "pine barrens" area of the school project was just being developed. Today a dense clump of trees in the area is used by all classes at the school to study natural resource relationships.







One of the things learned about outdoor classrooms as the years went by was that overuse can wear out an area so that it loses some of its natural charm. On some sites there must be judicious planning for periods of use.

Also, teachers need to keep in mind an overall objective and hold fast to it, not to stifle ingenuity but to keep enthusiasms from going off in all directions until the environmental studies lose their central purpose, which is giving youngsters the awareness, understanding, and sense of responsibility that will carry over into later years. ♦





Conservation— a plan for all seasons

Outdoor classrooms provide an almost endless variety of conservation learning experiences that can satisfy a child's curiosity about his environment.

Often this curiosity is the best guide to the use of natural resources in developing learning projects that bring about an understanding of the part people play in protecting and managing the environment.

Outdoor classrooms come in all sizes, and they often are perpetually in a state of change, because students year after year plan and develop their own projects for the classrooms. Enthusiastic and imaginative teachers, able to build on the curiosity and energy of children, can lead the environmental studies program toward ever-expanding intellectual and perceptual horizons for students.

Outdoor classroom experiences fit into every discipline, encouraging awareness that opens the way for comprehension. And these experiences are the only way that children can become active participants rather than passive spectators in learning how to protect and care for natural resources.

Here are some examples of ways that the curiosity of students and the enthusiasm of teachers and other adults have led to opportunities for real-life learning situations in environmental conservation.

For instance, what started as a small garden on a 10-foot-square flowerbed 3 years ago at Deaf Smith Elementary School in Rosenberg, Texas, is now an outdoor classroom that gives every student a chance to participate in conservation projects.

The flower garden introduced the students to soil and water as the basic resources necessary for plant growth, and it showed them how people can improve and enrich the soil to benefit plants. "They were so interested we couldn't keep them out of the flowerbed, and with 120 fifth graders, the garden was well cared for," said Richard Stadnicki, who was the first teacher to make use of the school site for conservation studies.

Now, each fifth grader has 25 feet of space for his own garden where he can do soil studies, plant flowers and vegetables, observe birds and insects, and share his findings with his classmates. Recently, with the help of the

Information for this article was furnished by SCSers Roy Hauger, Bennie Billington, Robert Keller, and Mickey Black, Texas; J. B. Earle and Gene Warren, Louisiana; Joe Covington and Watson Lawrence, North Carolina; Duane Bosworth, Oregon; and Lyle Tregaskis, Alpine School District, Utah. It was compiled by Kay Mergen, Information Division, Washington, D.C.

(Left) The edge of a pond proves to be a good hunting ground for specimens for a water ecosystem study by these Indiana students. (Left, center) Planting seedlings is part of the outdoor classroom project at Deaf Smith Elementary School, Rosenberg, Texas. (Photograph courtesy of *Fort Bend Suburbia*.)
(Right, center) The wildlife in an outdoor classroom brings about varied reactions from the students. (Right) The Alpine School District, near American Fork, Utah, makes use of a mountain camp throughout the year for environmental studies. Here the students are determining the water content of the snowpack.





County Extension Service, a study project on the nutritional values of different food plants has been added.

From New Iberia, Louisiana, comes the story of Park Special Education School for physically and mentally handicapped children where students learned to grow flowers and vegetables.

The New Iberia Women's Club provided materials and helped students with individual projects. Teachers found that students who worked on the garden project were eager to know more about how plants grow, how soil and water help plants to grow, and how the gardens could be improved.

When Mrs. Nina Parker, science teacher at Central Junior High School in Gatesville, North Carolina, decided that the best biology laboratory was the outdoors, she called on the Soil Conservation Service to help with a pond.

This project resulted in a cooperative agreement between the Gates County Board of Education and the Gates Soil and Water Conservation District. Now there is a conservation plan for the entire school site, and teachers and students are developing a variety of ecological and conservation studies.

Plants for the project were provided by the North Carolina Wildlife Resources Commission. A landowner donated the use of adjoining property for a learning trail. Now completed, with a pinebark mulch to protect the soil, the trail is being used by the entire school for many kinds of studies.

Student concern for erosion on the school grounds led to an outdoor classroom for Brownfield Elementary School near Baton Rouge, Louisiana. By the time the erosion was under control through proper soil preparation and seeding, the students were into tree planting. Last spring the entire community was invited to a conservation demonstration by students to show how they had developed their own study projects as well as improved the schoolyard.

At the close of the program, the outdoor classroom was dedicated to Marshall Hough, the SCS district conservationist who helped develop the conservation plan for the 5-acre school site.

Still another idea is being tried in Pampa, Texas. There the public school system is working to bring a wide variety of conservation experiences to the students.

A series of outdoor laboratories are planned at different schools, each emphasizing some aspect of ecological and conservation studies. Students will visit each school to supplement studies going on at their own school.

Mickey Black, the SCS district conservationist, is working with

Continued on p. 22

"Education that cannot wait"

by Dr. Clyde W. Hibbs
Chairman, Department of Natural Resources
Ball State University
Muncie, Indiana

Environmental education is characterized by S. P. Marland, U.S. Commissioner of Education, as "Education that cannot wait."

The quality of our environment has become a matter of serious national concern. And the big question now facing educators whose responsibilities include the preparation of future teachers is what strategy will be most effective in accomplishing environmental education goals.

During the past 30 years, many conservation education programs have relied on workshops for in-service teachers. Such training is valuable and necessary, but a more fruitful area might be greater emphasis on the quality of environmental education experiences provided for future teachers.

In designing curricula for pre-service teachers, emphasis should be placed on (1) developing an awareness of environmental problems and the role of teachers in improving the environment; (2) providing a basic understanding of scientific and socioeconomic aspects of the ecosystem; and (3) motivating action toward improving the quality of environment and equipping teachers to work effectively in achieving this goal.

This training can be achieved in varying degrees through the three components now existing in teacher education experience —general education, subject area specialization which includes environmental understandings, and the professional preparation for a teaching career.

Providing an environmentally relevant adisciplinary general education program will require major restructuring of existing courses or developing new ones in many colleges. Admittedly it is difficult for a faculty with discipline orientations to develop and teach adisciplinary courses. But unless this is accomplished, the general studies component of teacher training can become an aggregation of existing courses, often with questionable relevance to man-environment problems.

This difficulty is equally true in the area of subject specialization. Not only will it be necessary to restructure existing courses and develop new ones, but a special effort to interrelate and focus various disciplines on environmental problems will be required. This can be accomplished by faculty members having an adisciplinary orientation, by team teaching, through interdepartmental seminars, or by other appropriate methods.

The professional education component warrants special consideration if tomorrow's teachers are to be environmental educators. Throughout the undergraduate experience, general education, subject area specialization, and professional education should be skillfully integrated in complementary fashion.

Those entering the teaching profession should realize that environmental challenges require an effective kindergarten to twelfth grade educational program in all subject areas. They should also understand the unique and important opportunities that will be theirs in helping determine the quality of man's environment.

Beginning in their freshman year, prospective teachers should participate in a carefully planned series of experiences designed to achieve environmental education objectives.

The introductory course should include (1) the interrelationships of the various earth components —minerals, air, water, soil, plants, animals, and human resources; (2) the relationship between various disciplines and environmental studies; and (3) consideration of contemporary environmental problems, their causes, effects, and possible solutions.

Subsequently, students should have an opportunity to explore environmental components in depth through course work, participating in practicums and other types of internships, engaging in various types of environmental encounters, and associating with

competent and dynamic environmental educators.

Also, they should have the opportunity to learn how to integrate environmental understandings into teaching-learning experiences.

To accomplish the environmental education objectives there must be a high degree of involvement on the part of the student with professional conservationists, decision makers, resource agencies and environmental organizations, and professional educators. To be successful in this area, the teacher will not be able to accept the status quo without critical evaluation. Innovation and creativity will inevitably find expression as those in environmental leadership roles interact frequently with the educational milieu.

Developing a pattern for teacher certification for environmental education may serve as an effective way of motivating teachers to become better prepared in environmental studies. The method of achieving certification, however, and the criteria may differ among states and educational institutions. A number of states have recently expressed interest in certifying teachers in this area, and teacher certification patterns already exist in a few states.

The Teacher Certification Committee of the Conservation-Outdoor Education Association of Indiana, Inc., has recently submitted a certification proposal to the Division of Teacher Education and Certification, State Department of Public Instruction. The proposal is for certification in environmental conservation for a teaching minor and major at the undergraduate level and for a coordinator in this area at the graduate level.

Because of space limitations, only the recommendations for the teaching minor and major are listed here. A teaching minor in environmental conservation that would relate closely to and provide support for a variety of teaching majors should be the first step in teacher certification in environmental studies.

Nothing can be more important, over the long run, in achieving environmental quality than the improvement of the quality of education in this area for future teachers. Herein lies a unique challenge and great opportunity for colleges and universities everywhere. ♦

Recommendations for Teacher Certification in Environmental Conservation

Minimum of one course to be completed from each of the following groups:	**Teaching minor— Semester hours**	**Teaching major— Semester hours**
Introduction to Natural Resources. To include: (1) interrelationships of minerals, air, water, soil, plants, animals, outdoor recreation, and human resources; (2) the relationship of the various disciplines to environmental conservation; and (3) consideration of contemporary environmental problems.	3	3
Biological Sciences. To include ecological relationships.	3–9	3–9
Earth Sciences	3–9	3–9
Physical Sciences	—	3–9
Economics, Political Science, and Sociology. To include a study of population and demography.	3–9	3–12
Special Resource Areas. To include basic resource areas, outdoor recreation, and resource management.	3–9	3–12
Methods of Teaching Environmental Conservation	3	3
Electives in Environmental Conservation. To include urban and regional studies.	0–6	0–12
Total	24	40

Changing the face of school sites

by Jerry Schwien
Public information specialist, SCS
Denver, Colorado

Community involvement is changing the face of 18 school sites in Pueblo, Colorado.

Parents, teachers, city officials, state and federal agency personnel, civic organizations, and industry are donating time, labor, and money to develop school sites as environmental study areas. They want to give the young people of Pueblo the opportunity to learn about natural resources and their importance to Colorado, the nation, and the world.

At Irving Elementary School, for example, mountain, foothill, and desert plants grow within 100 feet of each other on what was once bare and eroding land. And at any time of the day, children of all ages can be found investigating the ponderosa pine of the mountains, the upright juniper of the foothills, or the barrel cactus of the desert.



The outdoor classroom at Irving Elementary School, in Pueblo, Colorado, has been developed to represent desert, foothill, and mountain regions in miniature. Typical of Colorado grasses is big

The entire movement toward using community help in developing Pueblo school sites as environmental study areas began 2 years ago with Irving School and its principal, Ed Lane.

"Being a former science teacher, I was interested in developing our school grounds as a nature study area," said Lane. "We asked the Soil Conservation Service for help in developing a basic plan for the site and in selecting appropriate plants.

"Then the Pueblo Beautiful Association became interested in the project and selected landscaping of Irving School as its main goal for 1971."

Plans were just getting started when Irving was chosen through the Pueblo Beautiful Association as the recipient of a $750 beautification grant from Chevron Oil Corporation.

"That really got the ball rolling," said Lane. "Before long everyone was helping. The Pueblo Lions Club gave $300. The PTA sponsored a spaghetti dinner and raised $100. Students earned money from a tamale sale, candy sales, and collecting cans and bottles.

"Teacher Corps interns sponsored a carnival. The Denver Nursery donated $100 worth of plants. And to top it off, the school district provided more than $600 worth of materials and labor to install our sprinkler irrigation system, to haul in topsoil for use on eroded areas, to seed Kentucky bluegrass, and to build a decorative fence.

"Many parents, grandparents, and other interested people also helped. One person donated a variety of cacti, including a 40-year-old Spanish dagger, and helped in the planting."

Also planted on the school grounds were white fir, blue spruce, mugho pine, juniper, and





bluestem (left). Studies of a grassland ecosystem include soil and water relationships, grass as a soil-holding plant, and the importance of grass in the state's economy. Cactus plants (center) represent the desert areas of the state. A white pine (right) is studied as an example of mountain region vegetation.

bromegrass of the mountain region of Colorado; western wheat, pinyon pine, and sumac of the foothills; and prickly pear, barrel cactus, rabbit brush, snowberry bush, cholla, and big and little bluestem typical of the arid and semiarid regions.

The overall landscaping-plus-learning plan for the site was done by Charles Fenimore, landscape architect and board member of Pueblo Beautiful Association.

This development plan incorporated the ideas outlined in the earlier plan done by SCS in cooperation with Pueblo Beautiful Association and the Outdoor Education Committee of School District 60. This committee is composed of teachers and community leaders who are interested in promoting outdoor environmental education.

The Pueblo Regional Planning Commission coordinated and printed a summary of the project and plan as an "Environmental Study Area Prototype" for the benefit of other schools.

Since then, 17 schools in Pueblo County have initiated action to develop their sites in a similar manner.

Because of the community interest and participation in these projects, the Pueblo Beautiful Association is offering $250 in matching funds to each school that is developing its site as an outdoor classroom for environmental studies, and the school district has agreed to provide labor and materials for the projects. ♦

Outdoor classroom helps revive Indian traditions

by Rose Fleming
Public information specialist, SCS
Jackson, Mississippi

An outdoor classroom for environmental studies is helping to give students at Red Water Elementary School, on Choctaw tribal lands near Carthage, Mississippi, a new pride in their Indian traditions.

Maintaining Indian identity and culture is an important objective at Red Water, according to J. C. Bates, principal of the school.

The 240-acre study area on the school site is part of the 8,000 acres of Choctaw land in Mississippi—all that is left now to the Choctaw tribe of the 26 million acres they once controlled.

Through the Leake County Soil and Water Conservation District, Emmett Tynes, SCS district conservationist, and Bob Grigsby, SCS woodland conservationist, at the request of the Tribal Council, are providing technical assistance in developing the school site and in laying out learning trails in cooperation with teachers and students.

Music, art, and use of native materials in craftwork are all included in the outdoor classroom project.

Parents of the students are becoming interested in the project, and many of the older Indians, some in their 80's, have taught the children the Choctaw names of trees and plants.

The outdoor classroom will serve as the setting for some of the traditional Choctaw celebrations that are being revived, and the swamp areas are used by the neighboring Indian community of Bogue Chitto for its annual fall festival.

Charles Meeley, parent representative on the Follow-Up Program at the school, believes that outdoor classroom studies will encourage children to continue their education and enable them to combine a respect for Indian traditions with an understanding of the use and management of natural resources. ♦





(Top, left) Red Water Creek, two springs, and several swamps and bogs are part of the water ecosystem study area where today can be found the same kind of ducks whose wing bones were used as arrowtips for hunting by the children's forefathers. The







children can follow the tracks of deer, opossum, raccoons, and fox along the water's edge and gather reeds, cane, and grasses to keep alive the ancient art of basket weaving.

(Top, center) Music and dancing is taught in the outdoor classroom at Red Water Elementary School. Students, under close supervision, build campfires and dance around them as their forefathers did. "Traditional music and dances almost had been lost here," said Sue Ellen Morrison, music teacher. "Only one of the six communities making up the Tribal Council had continued to dance the traditional dances. Choctaws who knew these dances taught others, and now they have outdoor festivals."

(Top, right) Students at Red Water School learn to identify trees and other plants by their common name, scientific name, and Choctaw name. Chewing the sap of the "Heiki-Uppe" (sweetgum, or *Liquidambar styraciflua*) is as enjoyable for these youngsters as it was for their ancestors. And the leaves of the "Itle-Homie" (sourwood, or *Oxydendrum arboreum)* can quench their thirst just as they did for the Choctaw long before the white man arrived.

(Bottom) The ancient Choctaw made rabbit hunting sticks from hickory trees. Miss Linda Johns, teacher, and Emmett Tynes, SCS district conservationist, explain to the children how the sticks were made.

Environmental education: homebrew

In Billings, Montana, we don't need to hold our breath, wondering if our environmental education program will be federally funded again—it never has been.

We've got a homebrew program here, locally developed, locally staffed, cooperatively run by Eastern Montana College and the school district, and supported entirely by local funds, mostly raised by the Parent-Teacher Associations and students.

From a small start, 30 sixth-grade children in the spring of 1967, the program has grown immensely. All of the 1,650 sixth-grade children in Billings, including those from four parochial elementary schools, participated in the program in the spring of 1973. The program also involved about 240 college students in various credit-bearing contributions.

Our environmental education program is like the proverbial oak tree that grew steadily from a small acorn. As our program grew it developed wide roots of support and service from many sources.

Today, the sixth graders have a month of intensive in-school and on-the-schoolgrounds instruction in and experience with environmental investigations and studies. The frosting on the cake is 2½ days at a rented camp in the Beartooth Mountains, in groups of about 200.

At the camp the children get about 10 hours of intensive "hands on" field studies in four areas: aquatic and terrestrial ecosystems; geologic and geographic studies; plot studies, in which a small plot of ground is intensively analyzed; and wildlife ecology. The children can apply some of the special skills learned and practiced in the pre-camp session.

During their stay at camp, the children also have some camp-craft instruction, supervised sports in their free time, opportunities to do artwork using native materials, first aid instruction, and dramatic, musical, and inspirational activities.

The pre-camp instruction and the field studies at camp were all carried out last spring by a group of 21 college men and women who in the winter quarter had taken the 3-credit course, "Instructor Training in Environmental Education." Next, in spring quarter they were enrolled in a 14-credit block—8 credits for their 3 or 4 hours per day of working in the schools with the sixth graders during April, and going to camp for the full month of May as the primary field instructors.

The camping skills and sports activities were the province of other specially trained students from Eastern, and art students from the college assisted with the creative projects.

To meet the problem of supervising the children on a 24-hour basis while they were at camp, 180 college students who had taken a 3-credit course in camp counselor training worked as camp counselors.

During the college's spring quarter, the "Environmental Workshop for Teachers" was offered for the eighth time in the last 5 years. It's a 3-credit course for all elementary teachers, covering the philosophy of the program and introducing teachers

through actual experience to some of the major instructional units. For its conclusion, the course runs the teachers through the full field program at the camp so that they know what the children will be experiencing. All sixth grade teachers accompany their students to the camp.

In addition to the workshop, teachers use a curriculum guide, "Exploring the World." The guide, written and printed locally and now in its second edition, has been expanded from 28 instructional units to 82 units that cover not only ecological studies but also math, art, and social studies.

From the beginning, the medical community in Billings has provided a physician in residence at each camp session who not only looks after the children's physical needs but also teaches them basic first aid.

Since the first session, PTA financial support has increased. Each year, program staff people visit PTA meetings with a tape-slide story of the camp program. And the schoolchildren have devised their own fund raising activities that also serve as learning experiences. These include hot dog lunches, selling doughnuts and coffee during elections, and selling "spook insurance" in their own neighborhoods just before Halloween.

Although faculty volunteers from Eastern Montana College ran the program for the first 5 years, the members of the local school board and the public school administrative staff were always consulted and kept informed.

In the summer of 1971, the Billings School Board accepted total responsibility for the camp program, and added Ed Heiser, a former sixth grade teacher and school principal, to the administrative staff as Environmental Education Coordinator. The college agreed to continue its in-service teacher training workshops and to recruit and train college students so necessary to the program. This arrangement has worked to the mutual benefit of the children, the college students, and the teachers.

In February 1972, Eastern Montana College was 1 of 10 colleges to win a Distinguished Achievement Award from the American Association of Colleges for Teacher Education. Eastern's was the only award-winning program that dealt with environmental education.

What have really been the ingredients that accounted for the success of the program? There are several:

(1) The program is multidisciplinary, with a sound educational philosophy much influenced by the solid thinking of Dr. William Stapp of the University of Michigan. The goals are, briefly, to help children learn about their total environment—biological, physical, social, cultural, and economic; to become skillful in analyzing and discovering through investigation and experiment the significant aspects of a problem; to become sensitive to their own responsibility toward maintaining a productive and livable environment; and to become motivated to work constructively toward the solution of environmental problems.

(2) The program has a solid foundation of support from parents and the professional community of Billings.

(3) The program directors worked with and within the school administrative structure to gain the respect, cooperation, and full support of the administrators.

(4) The program directors at the outset decided not to solicit federal or state funds, feeling that the program, if it proved itself, would engender local financial support. This faith has been justified.

(5) The program grew slowly because it did not depend on federal grant money that could provide an elaborate start and then possibly a quick fadeout when the federal dollars were gone. It expanded gradually as its local support base and acceptance grew.

(6) The program had the broad basic support of the college administration, although no financial support was sought or received.

(7) The program had the dedication of a few skilled college faculty members who have continually given their time and talent without compensation.

(8) And finally, and perhaps most importantly, the program is basically sound, practical, and concrete, and generally sells itself to creative and dynamic teachers and principals who see in it a way of making the educational process more valuable and more exciting to students. ♦

style by Dr. Wilson F. Clark
Chairman, Division of Science & Mathematics Eastern Montana College Billings, Montana

Through an open door

by (Mrs.) Helen Patterson
Teacher, Dodson Elementary School
Hermitage, Tennessee

I teach 32 lively fourth graders. Sometimes, when I say, "Let's go to the nature trail," I feel like a magician who has cast a spell.

Dodson Elementary School is nestled in the rolling hills near Nashville, Tennessee. The school site covers 15 acres. When the school was built, planners had the foresight not to denude the entire area. Land not actually required for buildings and recreation use was left in its natural state, and there we have our nature trail.

Our nature trail is self-guiding. Signs, which are excellent tools for teaching language arts, give



information about animal habitats, kinds of soil, rocks, trees, and wildflowers. At one place we have some old stumps set around the edge of a mulched area. That is our outdoor classroom.

This area, where students can gather, provides endless learning experiences. One of our favorites is to sit quietly with eyes closed for a short time and listen. The students then list the sounds they heard and compare notes. Each time we do this, the students become more and more aware of sounds. The end result has been that the children have become better listeners in indoor classrooms.

For an art lesson, all that is needed is some paper, pokeberries, and a few wildflowers. A stump serves nicely as an easel. The children furnish the imagination, and their finished products represent individual interpretations—in vivid colors.

One day last spring we decided to organize a band. Hollow logs became drums for the rhythm section; rocks served as cymbals; and blades of grass worked like a comb to carry the melody. And so the Patterson Hillbilly Band was organized. As one boy put it, "We sure do come up with some groovy sounds."

On occasion, we take the autoharp or a guitar to the outdoor classroom, and the children compose new lyrics for familiar melodies.

One day we had the word "erosion" in a reading lesson, and one of the children kept stumbling over it. Another student tried to explain the word, and finally said, "Let's go show him." And indeed we found erosion on the schoolyard.

A discussion of ways to remedy the problem followed, and then we launched a project to control the erosion. So we had a conservation lesson that grew naturally out of a textbook lesson.

The children are eager learners in our outdoor math class. Using the body as a standard for measuring, they learn to estimate the height of trees, telephone poles, and the school building. They estimate distances and learn to pace off yardage, which gives them an idea of the size of an acre of land as well as of many other concepts dealing with measurement.

Concepts taught in science and social studies are better taught "where the action is." We have compared insect activities with human occupations. The lighting experts are lightning bugs or fireflies; masons are dirt daubers; papermakers are wasps; and chefs are honeybees. Nurses are compared to ants caring for eggs, and the garbage men are beetles.

Children are more expressive in creative activities when they are out in the open spaces. Dances, folk games, and Indian games become more fun. The children often dramatize stories using natural materials, and they create adventure stories and poems about their trips to the nature trail. Often the animals they observe are the subjects.

Last year when a field trip was canceled because of a shortage of busses, the children planned an all-day "field trip" on the school site, complete with a picnic. Most of the children said it was the best field trip they had ever had.

At Dodson, we believe that our outdoor classroom can be a source of enrichment in every subject, and our goal is to guide the students in becoming aware of their environment and to instill in them a desire to use resources wisely. ♦



(Left) Soil formation studies begin with a discussion of rocks as parent material during a class in Dodson Elementary School's outdoor learning area.

(Right) Pokeberries and other natural materials are used to create designs and pictures by fourth graders.

Experiences unlimited

by Joe E. Wright
Environmental education consultant
Indiana Department of Public Instruction
Indianapolis, Indiana

An 11-year-old boy shouts "Snake!" And the group of sixth graders and their teacher stop in their tracks. Silently they watch the snake wiggle away into the underbrush.

Then follows an excited discussion. Where does the snake live? What does it eat? Does something eat the snake?

Farther down the trail, a boy points to an old rotting log. Teacher and students gather around the log, looking at the moss, several kinds of fungi, and some scurrying bugs.

Two boys flip the log over. "Wow! Look at all those things," says an excited girl, sighting snails, earthworms, ants, termites, salamanders, and many other small creatures.

The group spends about 30 minutes here, asking questions and discussing this small ecosystem. Photosynthesis, decomposition, nitrogen cycles, energy transfer, and soil enrichment all enter into the discussion.

The group, seeing, touching, and smelling, is experiencing something that cannot be duplicated in a classroom. And the teacher reflects the enthusiasm of the students. She has become a participant rather than a lecturer.

This group of sixth graders from Bartholomew Consolidated School near Columbus, Indiana, is typical of several that now have an opportunity to use outdoor classrooms to enrich the school curriculum. Indiana educators are finding that such experiences in a natural environment can help

These fifth graders (below, left) chose "gully plugging" as their conservation action project. Plant identification (center left) opens the door to many environmental learning experiences—soil-plant relationships, insects and birds that feed on plants, seed dispersal adaptation of plants, and animal





students to better understand their role as passengers on the spaceship Earth.

Their conservation education program is open-ended and flexible so that individual interests can be pursued. Many students are "turning on" to education because of their experiences in the outdoor classroom. They are motivated to read more, to write, and to discuss in class their encounters with the natural environment.

In an outdoor learning program, an informal outdoor environment replaces the formal classroom. Outdoor experiences complement the school curriculum by continuing the educational process that sometimes is limited both physically and mentally by chairs, desks, and four walls.

The program encourages practical application of knowledge gained in the classroom and helps to develop conceptual thinking by introducing problem-solving and self-discovery experiences.

In the outdoor classroom, verbal and abstract "indoor learning" comes alive through real experiences. The vicarious world of books is enhanced and enriched by a world of real things.

Many educators who feel that contemporary curriculum leans too heavily toward the abstract believe that outdoor classrooms can be styled to provide the variety of concrete learning experiences needed by children.

As one teacher put it, "One experience is worth 1,000 pictures." What are we waiting for? ♦

populations that live in the soil beneath plants. These students (center right) are studying the decomposers that are breaking down a fallen tree and returning it to the soil where it will furnish nutrients for new plants and humus for the soil. (Right) There are many things to observe and study along a woodland trail.





A community approach to outdoor classrooms

by Claude Crowley
Information specialist, SCS
Fort Worth, Texas

The Arlington Conservation Council, a citizen group in Arlington, Texas, has set environmental education in the public schools as a major goal. It is working to establish an outdoor classroom at each of the 29 schools in the Arlington school system.

The ACC was established in 1969 and now has a membership of 150 individuals and 20 organizations. Interest in environmental education came about through a Council project aimed at bringing to public attention the need for preserving green areas and open space along the creeks that run through the fast-growing city.

In working with the city council, ACC members received a copy of an inventory and evaluation report of the Johnson Creek flood plain prepared by the Soil Conservation Service for the city's planning department. The SCS study supported the ACC idea that the flood plain has possibilities as a greenbelt or park. Furthermore, the study pointed out that the park has a great potential as an outdoor classroom.

"After we got the idea of outdoor classrooms from SCS, we voted to sponsor such classrooms for every school," said Mrs. Barbara Gaugl, president of ACC. "We felt that school sites should be developed for their educational potential whether the park was ever developed or not, but we still hope to do both."

Mrs. Kay Taebel was named chairman of the ACC education

(Below) Efforts to preserve Johnson Creek, in Arlington, Texas, as a linear park led the Arlington Conservation Council into environmental education projects for local schools. As part of the Council's conservation effort, weekly creek-walks are held to help educate the public to the need for good resource management in the community.
(Right) These schoolchildren are eager to learn about soil texture from Dick Coffee, SCS soil scientist. (Photographs courtesy of *Arlington Daily News.*)





project. She met with curriculum consultants from the Arlington schools and presented the SCS outdoor classroom slide program. As a result of these meetings, the ACC began serving as a center for environmental information and materials.

Mrs. Taebel also presented the slide program at a training session for secondary school science teachers; later she arranged a program on environmental education for the entire school board.

The first response came from a biology teacher at Lamar High School who requested help from the Dalworth Soil and Water Conservation District in developing an outdoor classroom. Since then, four more schools have asked for help through the ACC, which is coordinating these environmental education projects.

In addition to its continuing efforts to establish the Johnson Creek park, the Council is sponsoring a beautification program—money from recycling projects and from other sources is used to buy trees for schoolgrounds.

Bike-ology rides, sponsored for young people at so much per mile, anything from 10 cents to $100, is just one of ACC's fund-raising activities.

The group has developed another project that adds to environmental understanding. There are Saturday creek-walks for adults and youngsters. Experts from resource agencies, soil conservationists, biologists and geologists from the University of Texas, and city planners lecture during the creek-walks.

The ACC, as a community conservation group, firmly believes that outdoor learning projects can contribute to the environmental quality of the area. ♦

Conservation—a plan for all seasons

Continued from p. 7

Dr. James F. Malone, school superintendent; Jerry Cronister, coordinator of elementary education; and with teachers and students at each of the schools in developing the school sites.

The outdoor laboratory now in use at Pampa's Horace Mann Elementary School was designed to emphasize ecological relationships, the influence of seasonal changes, and wildlife habitat studies.

Another Pampa school, the Robert E. Lee Junior High School, is developing an area for the study of soil erosion problems by constructing banks of earth to show the influence of slope on erosion, and students have planted test-plots using 20 different grasses to observe the soil-holding properties of each. Gray County Soil and Water Conservation District furnished the grass seed.

Dr. Malone considers outdoor projects particularly significant to the High Plains area, "So much of our lives is related to the outdoors here," he said.

In Utah, conservation studies go on year-round in the Alpine School District, which owns a camp at the 8,000-foot level in the mountains. During winter, students carry on a variety of studies, including learning how to determine the water content of the snowpack and to estimate the amount of water that will be available to farms and cities in the valley below that depend on snow for their water supply.



In summer, fifth graders in the district spend a week at the camp studying resources of the mountain environment. One of the highlights is a visit from a local sheepherder who explains his problems in protecting his flock from predators.

Elementary schools in the Alpine district invite ninth grade science students from a nearby high school to help elementary students with environmental studies. Teachers develop objectives and worksheets for the ninth graders who are briefed before each project. This program not only gives elementary students more individual attention than could be provided by one teacher but also is a valuable learning experience for the ninth graders, teachers say.

Throughout the nation, similar outdoor learning programs are underway in cities and in rural and suburban schools. In cities, the results of erosion show up in the gutter instead of a stream but are there nevertheless for all to see.

Some schools make use of nearby parks, forests, and nature centers as well as their own schoolyards. School projects have been helped by parents, resource specialists, community leaders, and various organizations.

The opportunities for learning are there in every community. And the need is pressing if young people are to learn where they belong in the effort to protect and manage the environment. ♦

(Above) Curiosity overcomes traditional feminine fear of snakes on the Dodson School Nature Trail, near Nashville, Tennessee. (Below) Managing a vegetable garden proved a significant learning experience for students at the Park School for handicapped children in Louisiana.



Review

How to Plan a Shooting Field in the Northeast and Corn Belt. By Philip F. Allan, Olan W. Dillon, Jr., and H. Granville Smith. *Rev. 1973. USDA Leaflet 532. 8 pp., illus.* Gives information on site selection, layout, and management aids for a shooting preserve.

Stand Changes in the First 10 Years After Seedbed Preparation for Paper Birch. By John C. Bjorkom. *1972. USDA Forest Service Research Paper NE-238, Northeastern Forest Experiment Station (Upper Darby, Pa.). 10 pp., illus.* Study made in a 7-year-old second-growth stand in the Penobscot Experimental Forest near Orono, Maine. Paper birch accounted for 75 percent of the volume and for 26 percent of the number of trees. Preparing regeneration sites by disking and burning after a paper birch seed tree cutting resulted in more abundant paper birch regeneration after 5 growing seasons than did logging only. But at the end of 10 growing seasons differences in number of paper birch seedlings by treatment were relatively small. Most of the paper birch trees were still of seedling size and were overtopped by aspen, other hardwoods, and softwoods.

Soybean Variety Date of Planting Study. By Charles R. Graves, Herman Morgan, Joseph R. Overton, and L. N. Skold. *1972. The University of Tennessee Agricultural Experiment Station Bull. 496. (Knoxville). 52 pp., illus.* A soybean variety date of planting study was conducted at Knoxville, Jackson, and Spring Hill from 1967 through 1969. Seven plantings were made at each location starting on April 15 and continuing at 2-week intervals until July 15. Data were collected for the dates of first flower, first fullpod, last flower, and plant maturity. Plant height, protein, and oil content were also determined for each variety. The varieties tested each year were: Harosoy 63, Kenty, Dyer, Hill, Dare, Lee, Pickett, Davis, and Bragg. Hood was evaluated in 1967-68, Wayne in 1968-69, and Custer, Lee 68, and York in 1969. The bulletin gives the results.

Combination Limestone-Lime of Acid Mine Drainage. *1972. Environmental Protection Agency (Cincinnati, Ohio). 23 pp. $3.* Gives results of testing the most promising technique for ferric iron acid mine drainage. It is also the most economical treatment method to remove iron, aluminum, and acidity.

Meetings

August

12–15 Conservation Education Association, Murray, Ky.
15–17 American Society of Civil Engineers, Hydraulic Division Conference, Bozeman, Mont.
26–31 American Chemical Society, Chicago, Ill.

September

10–15 American Fisheries Society, International Association of Game, Fish and Conservation Commissioners, Disney World, Fla.
23–27 Society of American Foresters, Portland, Oreg.
24–28 First World Congress on Water Resources, "Water for the Human Environment," Chicago, Ill.
26–30 International Symposium on Underground Waste Management and Artificial Recharge, New Orleans, La.
29–Oct. 4 National Recreation and Park Association, Washington, D.C.
30–Oct. 3 National Agricultural Chemical Association, White Sulphur Springs, W. Va.
30–Oct. 3 Soil Conservation Society of America, Hot Springs, Ark.
30–Oct. 4 Association of Conservation Engineers, Grand Canyon, Ariz.
30–Oct. 5 Water Pollution Control Federation, Cleveland, Ohio

October

4–5 American Forest Institute, Portland, Oreg.
6–7 Wilderness Conference, Boulder, Colo.
6–10 American Bankers Association, Chicago, Ill.
7–10 American Forestry Association, Lake Placid, N.Y.
7–10 Farm and Industrial Equipment Institute, Atlanta, Ga.
9–13 National Conference of Editorial Writers, Honolulu, Hawaii
11–14 National Association of Biology Teachers, St. Louis, Mo.
16–19 National Future Farmers of America Organization, Kansas City, Mo.
21–24 American Chamber of Commerce Executives, Cincinnati, Ohio
21–25 American Institute of Planners, Atlanta, Ga.
21–26 American Water Resources Conference, Seattle, Wash.
22–24 Urban Land Institute, Lake Tahoe, Nev.
28–Nov. 1 Adult Education Association of the USA, Dallas, Tex.
29–31 American Plywood Association, Atlanta, Ga.
29–Nov. 2 American Society of Civil Engineers, New York, N.Y.

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D. C. 20401

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300
AGR 101

U.S.MAIL

POSTAGE AND FEES PAID
U. S. GOVERNMENT PRINTING OFFICE

MOVING? Send present mailing label and new address, including zip code, to Division of Public Documents, U.S. Government Printing Office, Washington, D.C. 20401.



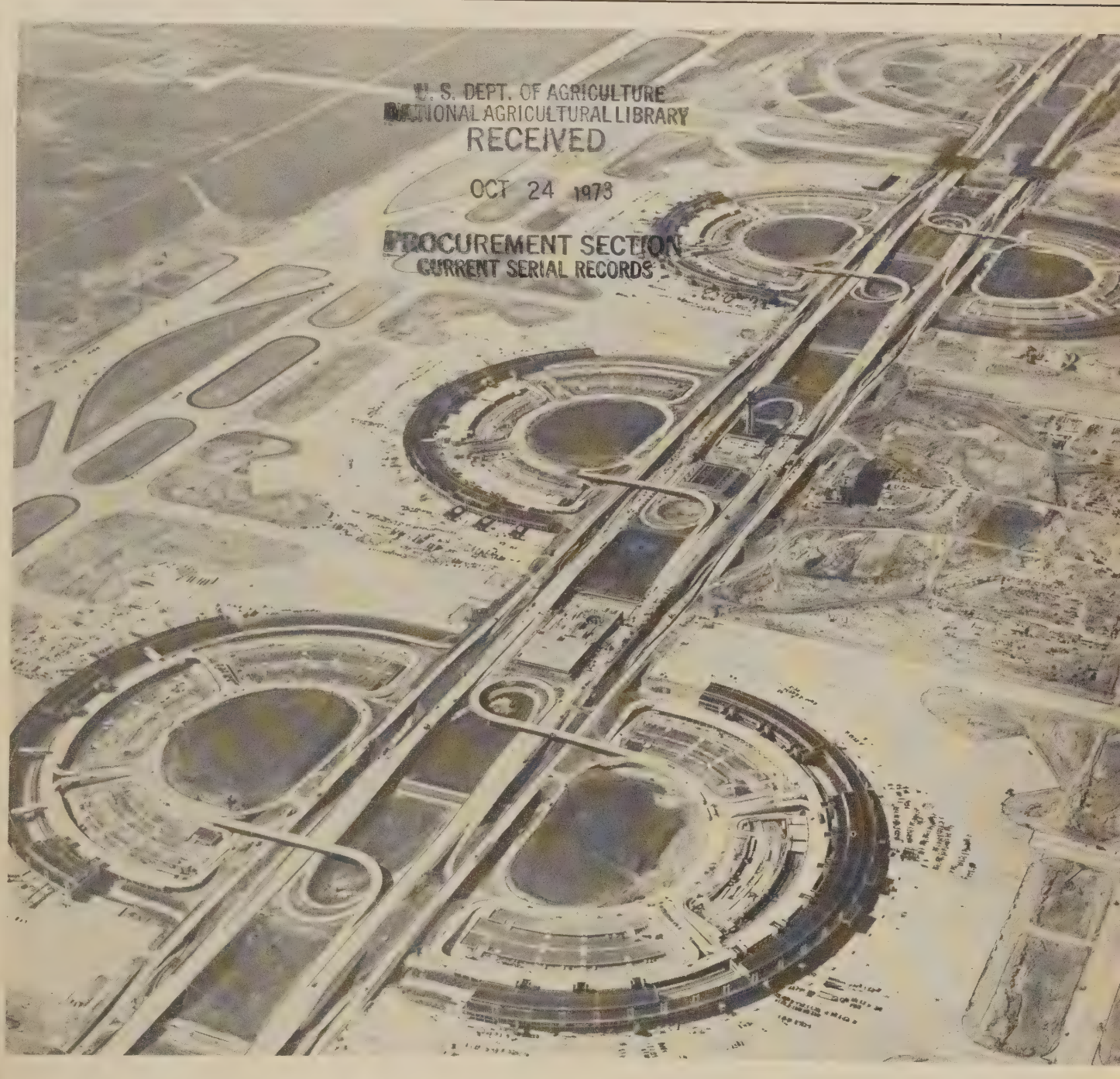
Examining a leaf in an outdoor classroom can be a new experience for many children who grow up surrounded by concrete, steel, and asphalt. In outdoor classrooms the natural envinronment becomes a subject related to all textbook subjects, thus helping the students to view the activities of man in the context of nature.

6
35

SOIL conservation

U. S. Department of Agriculture/Soil Conservation Service/September 1973

39/2



U. S. DEPT. OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY
RECEIVED
OCT 24 1973
PROCUREMENT SECTION
CURRENT SERIAL RECORDS

Recycling a resource

Waste management is fast becoming an integral part of many soil and water conservation plans prepared by the Soil Conservation Service.

The growing public demand for a better natural environment, coupled with the rise in livestock production over the past few years, adds urgency to the problem of disposing of the nearly two billion tons of livestock and poultry manure produced in the United States annually.

Animal wastes are a natural resource that can be utilized to good advantage. Several articles in this month's SOIL CONSERVATION illustrate that. Waste management techniques vary, but at present it appears that recycling wastes back to the land offers the best hope, in most cases, for satisfactory waste management.

Returning animal wastes to the land, without degrading the soil or water, is the oldest method of waste management known to man. But to do this successfully under the conditions of modern concentrated livestock production requires a careful evaluation of soil and plant cover on the receiving land. Knowing the capability of soils and plants to accept and safely assimilate wastes is an important prerequisite to the design of waste management systems.

Many different groups and agencies are testing new waste disposal and recycling methods. The expertise of SCS people in the field of soil science, plant materials management, and the application of conservation practices on the land, has helped us to help landowners achieve some gratifying successes. Together with the Agricultural Research Service, state agricultural experiment stations, and other groups and individuals, we are making progress in identifying soils and plants with tolerance and capability for assimilating wastes and rendering them either harmless or beneficial.

In working on this problem, we must continue to cooperate with the appropriate local, state, and federal health and regulatory agencies.

Our specific objective is to help landowners and others solve their waste management problems by systems which utilize or dispose of wastes without polluting soil, water, or—through objectionable odors—the air. In more general terms, waste management is one of many problems where we must constantly be aware of the need to balance the demands on the natural resources of our complicated technological society with the imperatives of maintaining and improving the environment for sustained use and enjoyment.

Kenneth E. Grant

SOIL conservation

September 1973, Vol. 39, No. 2

Contents

2 From the Administrator

4 Coal then, corn now
by Robert E. Craft

8 No odor and no pollution
by E. L. Abbott

10 Keeping the feeder in business
by Leland G. Jackson

12 A giant fits into the Texas environment
by Norwood McLendon

15 Recycling waste water
by Thaddeus S. Piwowar

17 A natural classroom
by Vincent J. Price

20 Selecting suitable sites for schools
by Ron Estepp

22 Conservation campus
by James E. Callahan

24 Review

24 Meetings

COVER: Texas has another giant—the Dallas-Fort Worth Regional Airport. And quite likely, the facility is the largest ever to receive conservation district assistance. (See p. 12)

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

EARL L. BUTZ, Secretary of Agriculture.

KENNETH E. GRANT, Administrator, Soil Conservation Service

PHILLIP A. CHAVEZ, Editor

MARYELLEN BERTRAM, Editorial Assistant

SOIL CONSERVATION, the official magazine of the Soil Conservation Service, is published monthly by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. Use of funds for printing this publication approved by the Director of the Office of Management and Budget, July 17, 1973.

Reprint permission: Contents of this magazine may be reprinted without permission. Credit is not required but is appreciated. Photographs are available on request.

Commercial names: Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscription: $3.50 per year, $4.50 foreign. Single copy, 45 cents. Discount of 25 percent on orders of 100 or more sent to same address. Order direct from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Coal then, corn now

by Robert E. Craft
Information specialist, SCS
Champaign, Illinois

A visit to Fulton County, Illinois, a discussion with Keith Mueller, district conservationist, Soil Conservation Service, and with several others directly involved in the "Prairie Plan" revealed a tremendous environmental undertaking.

Time was when strip-mined areas were a problem for the folks in Fulton County, Illinois. Today, the same old mine-waste areas present an opportunity. This is because one of the largest and most imaginative strip-mine reclamation projects in the world is now underway in the county.



Keith Mueller, SCS district conservationist, calls the Prairie Plan a "giant of a program."

The project is a joint venture of the Fulton County Board and the Metropolitan Sanitary District of Greater Chicago (MSD). Their foresight is bringing rapid transformation of raw mine cuts and spoil banks into productive crop and pasture land and recreation areas.

Keith Mueller, of the local SCS office, describes the reclamation project as a "giant of a program." The project is known as the Prairie Plan and is very much needed for the more than 65,000 acres of land in Fulton County affected by local strip mining. Mining operations have put a blight on the land and have plagued local communities and government officials for years.

Mine waste areas in Fulton County and waste water materials from Cook County are now being recycled. Restoring these areas is adding greatly to the quality of the environment, and millions of dollars are being added to the county and township tax base. The project has brought many of the advantages of a large industry without most of the disadvantages industries sometimes create.

Mueller, whose business it is to provide technical assistance relating to land and water problems, pointed out some of the shortcomings of past mining operations—water pollution, soil erosion, sedimentation, and a lower tax base, along with destruction of prime agricultural land, open areas, and scenic views.

"With today's heavy earth-moving equipment and big barges available for transportation, it is practical to level the strip-mined areas and apply liquid fertilizer—the product of the waste water treatment process—on them so corn and other crops can be planted," Keith said. "There is no reason one can't expect average or greater yields when the land has been reclaimed."

That, in essence, is what the Prairie Plan is all about.

To learn more about the plan, I traveled over much of the 10,000 acres in the project area with Robert Carlson, who manages the operations of the Metropolitan Sanitary District of Greater Chicago in Fulton County and is the principal agricultural engineer.

This realistic land use plan calls for many conservation practices such as minimum tillage, leveling, grading, berms, conduits, and runoff basins. The holding basins, dredge, pumping station, and distribution system are the heart of the project. We visited each of these facilities and later went to Liverpool along the Illinois River where the barge-transported sludge is unloaded.

One tow of three or four barges makes its way to Liverpool each

day. Each covered barge holds 1,500 to 3,000 tons of sludge and requires about 2½ days to make the trip downriver.

The material is unloaded into a buried 20-inch diameter pipeline and pumped 10½ miles to one of the three holding basins on the project site. From there the material is pumped into distribution lines which carry it to individual fields.

An Illinois Environmental Protection Agency permit allows the application of the equivalent of 75 dry tons of fertilizer on the reclaimed strip-mine land in the first year, 60 dry tons in the second year, 45 in the third, and 30 in the fourth. After that, MSD will evaluate the effect of the liquid fertilizer and base a new rate on the findings.

At present more than 10,000 acres are in the main project area. Of that number, 1,700 acres were planted to farm crops such as corn, soybeans, wheat, grasses, and legumes in 1973. And 650 acres will have had liquid fertilizer applied.

Fulton County residents and their project have something in common with people all over the world. In Moscow and Paris waste sewage solids are being applied on the land. Other places include Melbourne, Australia; Nottingham, England; Leipzig, Germany; Capetown, South Africa; and Tijuana, Mexico.

Following my field visit of MSD





"Mining activities in the county are an increasingly difficult problem and substantial land areas remain to be reclaimed."

operations in Fulton County, Carlson reflected on some of the past history and on how a search was begun back in the early 1960's for the use of sludge from the Chicago area.

"MSD realized its problem of accumulating sludge," he said, "and was investigating ways of recycling wastes that would not contribute to air, land, or water pollution. In 1967, MSD's Board of Trustees formally adopted a recycling program for processed waste-water solids.

"The program used a system of 'reclaim and recycle.' Reclaim referred to reclamation of waste-land such as that in the coal strip-mine areas of Fulton County. Recycle meant the use of organically rich solids to help restore the disturbed land to former productive capacity."

Carlson mentioned the present concern, not only of those living in the area but also of MSD and county officials, with pollution from the use of waste materials. To combat this, Carlson explained that in the areas where the liquid fertilizer is applied there is a controlled discharge system that permits surface runoff to be checked prior to any discharge into natural streams or lakes.

In addition, monitoring wells are used to continually check ground water quality. The Illinois Environmental Protection Agency supervises this check area.

"As part of the overall Prairie Plan philosophy," Carlson said, "certain land areas have been set aside as nutrient barriers. These, in general, surround the recycled farms or lie within or adjacent to fields on which the liquid fertilizer is applied. They form buffer zones along public rights-of-way. They minimize surface runoff and provide the maximum nutrient and moisture uptake by the soil and growing crops.

"We feel," Carlson added, "that the farm field barriers are important for controlling and checking the application of liquid fertilizer on the land. Using these ridge lines or barriers is helping to insure the success of the natural filtering system."

The foolproof or fail-safe operation also includes runoff basins to catch the runoff for testing before release to the streams. The main purpose is to monitor all water passing through the system to guarantee that only clean water is allowed to leave the watershed.

The Fulton County Soil and Water Conservation District has taken an active interest in the reclamation project, and the Fulton County Board relies on district directors for guidance concerning soil and water management. Cecil Lundry, a conservation district director, is also a member of the county board.

The Fulton County Planning Commission envisioned the arrangement that is now in force with the Metropolitan Sanitary District.

Through the encouragement of the county board, MSD purchased about 7,000 acres of land in Fulton County in 1970.

The administrator of the Fulton County Planning Commission, Charles Sandberg, recently prepared a publication entitled "Land Use Survey of Strip Mines in Fulton County," which asserts that "mining activities in the county are an increasingly difficult problem and substantial land areas remain to be reclaimed. The effects of strip mining for coal are complex, interconnected and often difficult to assess."

Before 1962, according to Sandberg, there were no laws or regulations dealing with land reclamation in either Fulton County or Illinois. Many mine companies, however, voluntarily carried on reclamation programs.

Commenting on the Prairie Plan, Sandberg said, "This newly planned use of the land is a sound

Conservation practices are very much a part of the "Prairie Plan."





investment in natural resource management and a solution to many pollution problems."

Included as part of the total reclamation plan is a conservation area near St. David—more than 700 acres owned by MSD and leased to the county for $1 a year.

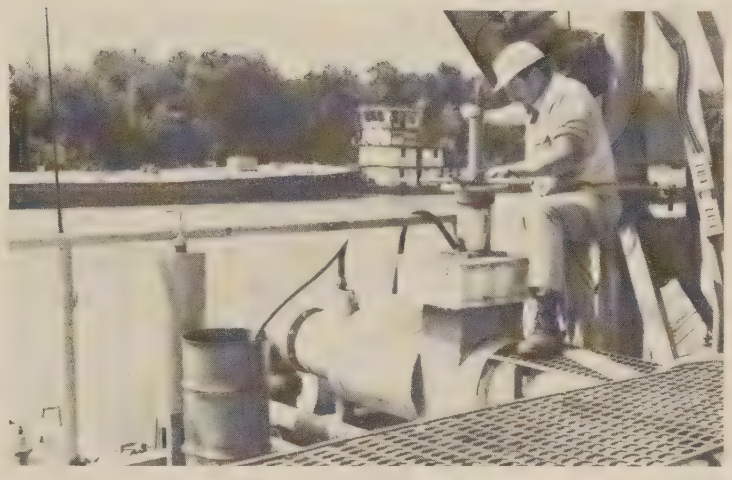
The conservation area is used for fishing, camping, boating, and hiking. Sandberg provided these figures for the first full year of its operation: Income, $14,848.96; expenses, $17,435.12. Some of these expenses included permanent improvements. Sandberg credited the successful operation of the area to manager Leon Zedric. Of special interest to Zedric are the shallow for-children-only lakes. Leon keeps them stocked with fish.

"This joint effort of the Fulton County Board and MSD is a real asset to the county," Sandberg commented, "and we look forward to the day when the area will be enjoyed by more and more men, women, and children."

To date, approximately $50 million have been spent in the planning, construction, and operation of the project, and it is just now beginning to bear fruit for the folks of Fulton County.

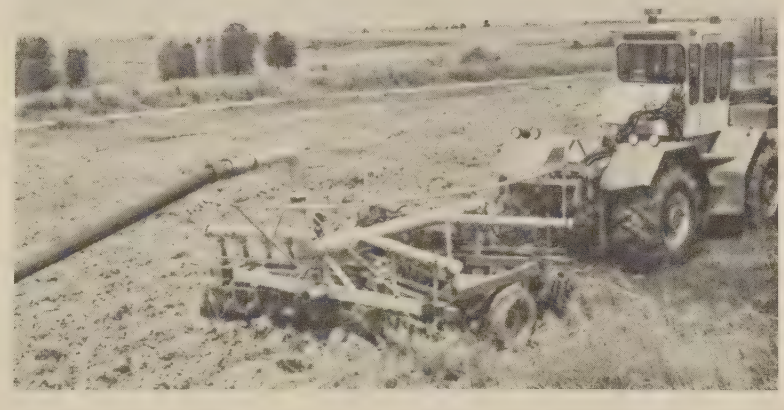
The Metropolitan Sanitary District considers the Prairie Plan a productive and profitable means of dealing with waste products.

Fulton County's wasteland problem has been minimized, and in Cook County, waste water solids are less of a problem. ♦



(Top) Waste water solids—liquid fertilizer—are transported by barge from the Metropolitan Sanitary District Plant at Stickney, Illinois.
(Above) The sludge material is unloaded at Liverpool, Illinois. The tug in the background is headed back to Chicago with empty barges.
(Left and below) The liquid fertilizer can be sprayed on a field or applied with heavy disclike equipment.





No odor and no pollution

by E. L. Abbott
District conservationist, SCS
Hondo, Texas

About 3 miles south of Devine, Texas, along Interstate Highway 35, there is a sea of green sloping westward up from the road. On the hilltop there are huge tanks, grain augers, and other equipment that make up a modern feed mill. This is the Morales Feedlot, Inc.

No ordinary feedlot, this one. It is referred to in the area as the "odorless feedlot." Even a big sign saying "Cattle Feedlot" would be deceiving, because the characteristic offensive odor of a feedlot is missing.

This, without a doubt, is the cleanest feedlot in the state, and it took a lot of ingenuity and considerable expense to make it that way. It has a total recycling system for feedlot wastes—the first in the state.

The feedlot owners have willingly sought advice from the Medina Valley Soil and Water Conservation District, the Soil Conservation Service, the Texas Water Quality Board, and other feedlot owners in the design and layout of their system.

The 16 cattle feeding pens, situated on the western slope of the hill, are all concrete with half the area of each pen under roof. The pens are designed so that all waste material on the floor drains downward.

The floors are flushed at regular intervals with water supplied by two 3-inch globe valves, each supplied in turn by 5-inch mains at the uphill end of each pen. A 100-horsepower electric pump furnishes water for this, as well as for the long concrete troughs from which the cattle drink.

All of the waste material drains into a concrete tile line which carries it into a two-compartment concrete detention pit 100 by 20 feet in size. There agitators powered by two 15-horsepower electric motors keep the slurry in motion while quantities of clear water are added. The liquid is lifted by a 125-horsepower electric pump with a capacity of 1,500 gallons per minute and flows under pressure through an 8-inch underground pipeline to two 275-foot pivoting irrigation booms which sprinkle the "brown water" on the deep sandy soil of the mowed fields.

In addition to the first detention pit, a second and larger concrete pit 100 by 500 by 10 feet deep provides an overflow catch basin, which comes in handy during heavy rains and gives further assurance that none of the waste material will escape into the neighboring property.

"We found that coastal bermudagrass is the most tolerant grass for this type of fertilizer-irrigation," said P. J. Morales, Jr., vice-president and manager of the feedlot. "So we are converting all the surrounding acreage to this grass."

The coastal bermuda is cut at intervals, hauled in for a dehydration process, then pelleted in the feed mill. The half-inch pure bermuda pellets are an important part of the rations fed to the cattle.

The mill has the capacity to produce 50 to 60 tons of feed per day in full operation, 4 or 5 tons of pellets per hour. Morales figures he gets 5 cuttings of grass per year, averaging 2 tons per cutting.

This harmonious ecological



This 260- by 100-foot pen holds 500 head of cattle. To facilitate cleaning, the pen slopes 2 percent down for 160 feet then has a 1 percent side fall.





(Top) A 30-inch concrete pipeline runs underground in the grassed strip, carrying the water and wastes from the feedpen.
(Above) Water and solid wastes from the 30-inch pipeline are collected in this 200- by 100-foot slurry pit. The holding pond in the background holds excess water and wastes. Slurried waste material is removed from the pond by pumping and is applied to coastal bermudagrass at a rate of 20 percent waste material to 80 percent fresh water.
(Below) Not only are the pens clean, but also the characteristic offensive odor of a feedlot is missing.



condition at the Morales Feedlot didn't just happen haphazardly. It has been the result of a desire on the part of the owners to create a pleasant atmosphere for themselves and their neighbors and still operate a successful business.

The owners are proud of the permit they have won from the Water Quality Board. They are not likely to receive the criticism that plagues many feedlot operators who have paid little heed to ecology.

In 1972 the Morales Feedlot was selected by the Medina Valley Soil and Water Conservation District as the plant or industry that had the greatest achievement in "Environment Control." It was entered in the Texas Conservation Awards Program and was selected Region II winner.

To keep the feedlots busy, with more cattle making more gains every day, Morales has two buyers on the job buying and shipping cattle to the lots from a radius of about 200 miles. About 30,000 cattle per year are fattened for market.

It would seem that there is nothing left to do but see that the present operation keeps running smoothly. But this is not so. The feedlot owners are experimenting with a special species of bacteria in the waste material to see if further breakdown is possible.

Strong believers in the welfare and health of others, the Morales' contacted every reliable source to be sure that pollution was a thing of the past on their holdings. More than a million square feet of concrete is contained in the feedlots so that no waste gets to the soil.

Teams of agronomists and engineers representing the Soil Conservation Service and other agencies have come from Texas, Oklahoma, Maryland, New Mexico, California, Arkansas, and other states to view this pollution-fighting industry. ♦

Keeping the feeder in business

by Leland G. Jackson
State conservation engineer, SCS
Lincoln, Nebraska

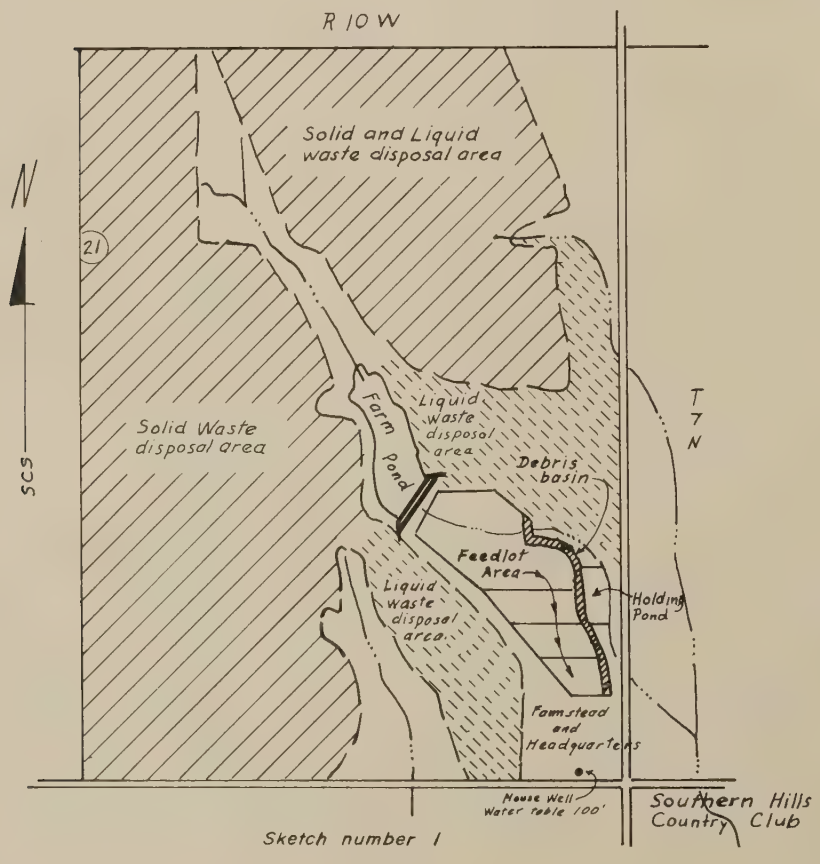
There are many waste management problems among the 17,000 feedlots in Nebraska. Federal, state, and local agencies have teamed up to help solve these problems, responding to new state laws that require some kind of control.

Kenneth Mayer and James Walter, owners of a feedlot in Adams County, 2 miles southwest of Hastings, had a waste management problem, and they turned to the Soil Conservation Service for help.

Jim Erickson, the SCS district conservationist in Hastings, and John Overing, the SCS area engineer designed a system to prevent runoff from the 1,000-head feedlot, and from 97 acres of cropland upstream, from passing through the Southern Hills Country Club on its way to the Little Blue River.

First they figured out a bypass system to keep the discharge from a farm pond out of the feedlot. Then they designed a debris basin and holding pond that would control a 10-year, 24-hour storm that could bring runoff from the lot. Liquids and solids were to be disposed of on certain areas of cropland. (Sketch 1.)

Before the system was installed, Mayer and Walter sold the feedlot to Eugene and Dwayne Krabel, who had been operating it.



Sketch number 1

The new owners, familiar with the system design, of course, hired a contractor to get the work going. They decided to use irrigation equipment they already had to handle the waste disposal on cropland.

Soon after the work was completed, however, the Krabel brothers told Jim Erickson they wanted to double their feedlot capacity.

Two new lots were established across a drain from the old one, making a separate debris basin and holding pond necessary. This time the existing farm pond was brought into the design as a tailwater recovery pit. In the redesigned system all liquid waste runoff is diverted into the recovery pit. (Sketch 2.)

The new owners also wanted a buried pipeline to carry liquid wastes from the ponds to the fields. A single, 8-inch line was designed to collect these liquids from both holding ponds and deliver them to the high point in the disposal area. There they will be distributed to the field rows through gated irrigation pipe.

Because it is to become a part of the system, the old pond now has its principal spillway capped and the emergency spillway closed. It provides 45-acre feet of storage, more than enough for a tailwater recovery system for 97 acres of irrigated cropland. This allows the Krabels to pump from the holding ponds when the weather permits, knowing the overflow will be trapped in the old pond and be repumped. Complete control of runoff from feedlot or irrigation is now a reality.

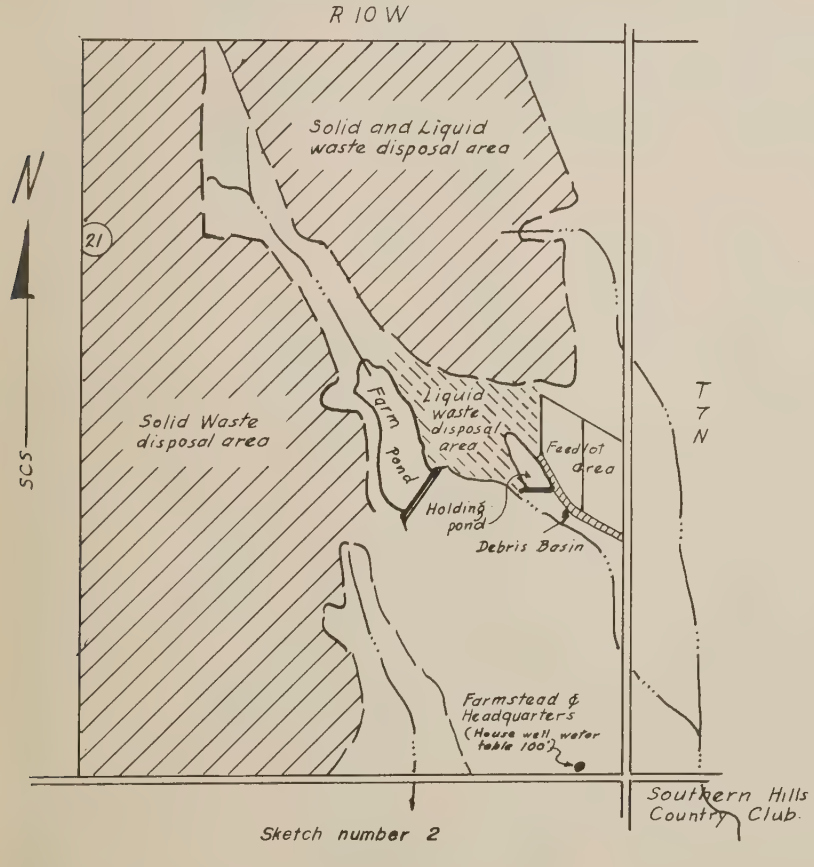
Cost of the system to date has

been $3,700. Pump and pipeline cost is estimated at $3,000. Some division of costs will be necessary, however, because the pump and pipeline will also be a part of the irrigation system. But the investment is in a system that will be adequate for 2,100 head of cattle and that will solve some pollution problems for fishermen down below and for country club golfers.

Nebraska law requires the state Department of Environmental Control (DEC) to inspect all feedlots to determine if owners violate water quality standards. If there are no violations, the owner is notified he has an "approved" lot. Should there be violations, the owner is given a specified time to install runoff controls. He is then inspected again.



Effluent from the feedlot collects in the holding pond in the foreground. Liquid and solid wastes are disposed of on cropland.



Sketch number 2

DEC bases its decisions on results of research conducted by the Agricultural Research Service of the United States Department of Agriculture and by the University of Nebraska. These same results are used by the Soil Conservation Service in developing standards and specifications for the design of feedlot waste control systems. DEC will accept any control system designed to SCS standards.

This approach has resulted in full understanding of the problems of waste management. There is no duplication of effort or overlapping of responsibility.

To date about 650 systems have been installed on Nebraska feedlots, and more are in the design stage. Some, like the Krabel brothers' system, have to be adjusted to meet new demands. But the teamwork between state and federal organizations is equal to the task. ♦

A giant fits into the Texas environment

The Dallas-Fort Worth Regional Airport, covering 18,000 acres of land, will be the largest in the world. And from the beginning, it was designed to fit harmoniously into the environment.

The airport is three times larger in land area than New York's Kennedy International, twice as large as Chicago's O'Hare, and six times as large as Los Angeles International. The airport, in fact, is larger than Manhattan Island.

When fully developed, it will have the capacity to handle more air traffic than New York's three airports combined. On a daily basis, approximately 52,000 passengers will be using the new airport this year.

"The Dallas-Fort Worth airport will make its own contributions to the development of this region and will have its own responsibilities in being a good citizen," declared Jack Downey, deputy executive director of the airport.

"Basically, the airport will become a part of the whole, consistent with the planning of the region, and will meld into and become an integral part of the land." Downey predicted

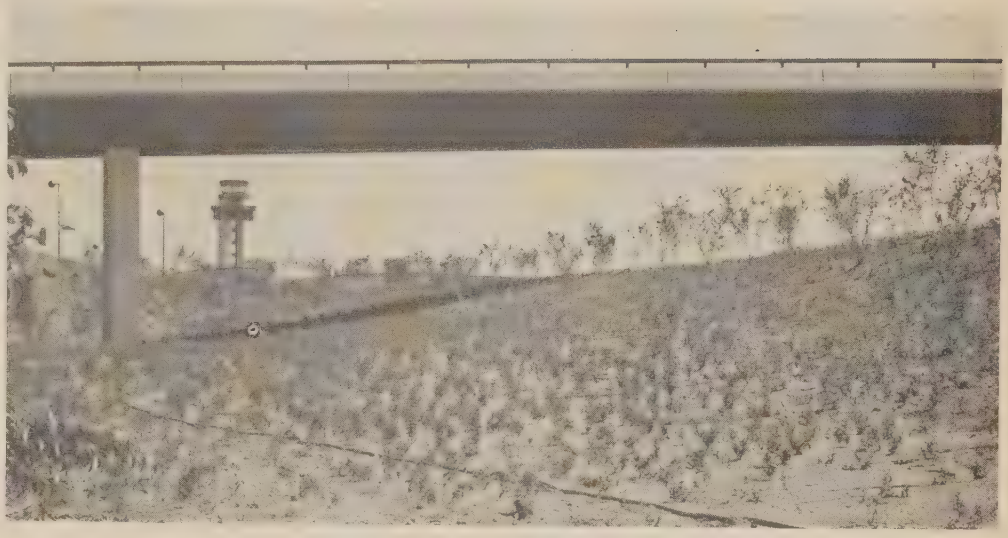


Bermudagrass, shrubs, and trees will protect this part of the "world's largest airport."



More than one and a half million trees, shrubs, and ground cover plants are to be used in the airport's landscape design.

by Norwood McLendon
Information specialist, SCS
Fort Worth, Texas



Many slopes were planted to honeysuckle and crapemyrtle to help prevent erosion.



About 12,000 acres are receiving prompt conservation treatment at the 17,000-acre facility.

that the airport "will open the door to social and economic progress for the Dallas-Fort Worth area."

The new airport is scheduled to be in operation in October of this year.

More than one and a half million trees, shrubs, and ground cover plants make up the airport landscape design.

According to John Pate, airport landscape manager and former Soil Conservation Service employee, many native materials are to be used at the airport, as well as commercial plants.

"The 6,000-acre area of initial operations will be planted in bluebonnets, crimson clover, crownvetch and Indian paintbrush," Pate said. "Lawn areas will be covered by common bermuda. All utility lines will be underground, and landscaping will give the airport a parklike atmosphere.

"Soil viability in the areas reserved for future development will be maintained by farming, reforestation, and extensive use of new trees and plants," Pate said.

"Presently, soil erosion problems appear mainly on the eastern half of the airport acreage. This is largely neglected land formerly in row crops which probably will give way to wheat, grass, and certain rotational crops.

"The western part of the acreage is heavily wooded and grass-covered beneath oak and cedar. In all, about 12,000 acres of the property will be conservation treated as soon as possible."

Streams that pass through the airport area will be protected. The master plan insures that wastes will not contaminate these waterways. The airport is designed so that grading and paving make minimum changes in the natural drainage patterns.

Runoff is more rapid because of paved surfaces, which is a planned advantage in that the airport runoff gets into the streams before the crest from the total watershed and therefore does not increase flood levels.

Wastes from the airport are handled in keeping with the best methods available to insure maximum recycling benefits and minimum waste materials. An ultra-modern solid waste disposal plant will burn garbage at intense heat with minimum detrimental effect on the environment. Solid waste will be delivered to the disposal plant in completely automatic "airtran" containers.

The airtran system basically is designed to move people. The rubber-tired, electric vehicles move automatically in concrete guides, or troughs. "If the troughs had water in them, we'd have the longest log-ride in the world," airport employees say.

Ernest Dean, deputy executive director for engineering, believes the earth-moving operation at the airport to be one of the largest ever undertaken. An estimated 35 million cubic yards of earth have been or will be moved.

Howard McDaniel, the Soil Conservation Service's district conservationist in Fort Worth, said the airport plan quite likely is the most extensive ever to involve conservation district assistance.

Airport authorities signed a cooperative agreement with the Dalworth Soil and Water Conservation District as major terminal and runway contracts were nearing completion.

Dallas-Fort Worth is the first airport to be constructed based on a master plan that allows for the demands of aviation to the year 2000 and beyond.

Initially, four terminal modules and three commercial runways will be in operation. Ultimately, 13 terminals and 6 runways will be in operation, as well as separate runways and facilities for business aviation and for STOL (short takeoff and landing) aircraft.

The new facility is having and will continue to have a tremendous economic impact on the north Texas area. According to a recent independent study, about 15,000 new jobs will be created. About $267 million in goods and services will be purchased in 1975, and this will lead to an additional $340 million in purchases. The total economic impact in that single year will be over $600 million—more than 10 times the cost of the airport's land, which is the only investment the cities of Dallas and Fort Worth will ever have to make.

The land was purchased by the two cities, but construction costs are financed by airline-backed bonds that will be retired through airport revenues and federal funds. Cost estimates for the airport's opening phase—including land acquisition, construction costs, and development of entry highways—total more than $700 million.

Everything about the new airport is Texas-size, but the bigness serves to demonstrate that construction projects, small and large, can be built in harmony with the environment. ♦

Recycling waste water

by Thaddeus S. Piwowar
District conservationist, SCS
Allegan, Michigan

Using the land to dispose of wastes produced in food processing is not new.

Michigan Fruit Canners, Inc., a subsidiary of Consolidated Foods Corporation, in Fennville, Michigan, has been doing that for 20 years. And for as many years the company has had the problem of finding soils that can absorb the liquid wastes.

In 1952, Michigan Fruit Canners became a cooperator with the Allegan Soil Conservation District and asked for help in locating a waste disposal site on a 60-acre piece of company land just southeast of Fennville.

Soil Conservation Service people, using a soil survey of the property, located about 8 acres of deep, well-drained sandy soil; the rest of the acreage has poorly drained sand and somewhat poorly drained sand over clay.

In 1953, SCS designed and helped install a terrace system on the well-drained soil. Waste water was moved to the area through quick-coupling irrigation pipe and applied on the land by rotary sprinklers. Everything worked fine for awhile until an unforeseen problem emerged.

The high amount of organic material in the waste water had sealed the surface soil, preventing water from soaking in. Periodic discing to keep the soil open worked for awhile, but eventually the sealing problem made it necessary to extend the waste water distribution system over the area of poorly drained soils.

During periods of peak use, the soils could not absorb all of the water, and the resulting runoff polluted a nearby county drain and Mann Creek, a trout stream.

The company was cited by the Michigan Water Resources Commission. Unless it found an efficient method of waste disposal, the company would have to move from Fennville. This would bring an economic blow to this community of 700 people and would deprive many neighboring fruit and vegetable growers of a market.

Food processing operations begin with the asparagus season, May and June, and waste water produced at this time is about 300,000 gallons per day. As other fruits and vegetables are harvested, the pace of processing increases. A peak waste water discharge of about 1½ million gallons per day is reached late in summer or in autumn. The city's sewage disposal facilities cannot handle this large volume of waste water.

In 1972, a 40-acre farm adjacent to the company's waste disposal area came up for sale. The owner of the farm also was a cooperator with the Allegan Soil Conservation District, and he had a soil map of his land.

The map showed well-drained



Diversions were needed to shorten long slopes on the disposal field. A local contractor is sowing a grass mixture on a recently built diversion. The sprinkler above the diversion delivers 250 gallons of waste water per minute, covering an area of just under 2 acres.



Scotch pine and blue spruce seedlings were planted by Boy Scouts as a future screen around the waste-water disposal site. The author, right, and Ron Prentice of Michigan Fruit Canners check the new growth of a Scotch pine.

soils suitable for a waste disposal system, so the company bought the farm.

Michigan Fruit Canners hired a consulting engineering firm from Grand Rapids to design an underground distribution system for the 15 sprinklers to be installed on the newly acquired farm.

The system includes a pit and screens at the plant where solid waste of all kinds is removed. This waste material is disposed of at the city's sanitary landfill. The remaining waste water is pushed by two centrifugal pumps through two underground pipelines to a 28,000-square-foot holding pond located about half a mile from the plant.

A six-pair telephone cable has been installed from the plant to the pond so that it is possible to monitor up to six different things, such as water level in the pond, temperature, and alkali content.

At the holding pond, two pumps distribute 800 gallons of water per minute to the sprinklers. These pumps are automatically controlled by float switches in the lagoon. Each sprinkler delivers 250 gallons per minute at a nozzle pressure of 75 pounds per square inch and covers an area of just under 2 acres.

The system applies about three-tenths of an inch of water per hour. Consequently, it is necessary to carefully manage the distribution areas to maintain soil structure and vegetative cover. The company has a full-time employee for the constant surveillance and maintenance of the waste disposal system.

The underground system was installed on the newly acquired acreage in 1972 after the fruit trees and vineyard had been removed. On the north 10 acres the soils are loamy sand, but the slopes are fairly steep—6 to 8 percent. And some slopes are up to 400 feet long. Some erosion occurred in this area during testing of the system, according to Ron Prentice, the plant manager. He said, "It was evident that soil conservation measures would have to be established."

A local contractor installed 1,500 feet of diversions with a bulldozer and grader. The diversions were fertilized and seeded to a mixture of domestic ryegrass and smooth bromegrass. Four grassed waterways, established by the previous owner, were fertilized with nitrogen and used as diversion outlets.

The Soil Conservation Service, in developing a conservation plan for the area with Prentice and Ray Floate, the company's industrial relations manager, suggested that the new acreage be managed as hayland. Last spring an area in the northern part was seeded with a mixture of red and alsike clover and smooth bromegrass. About 10 acres more will be seeded each year until completion. Arrangements have been made for a local farmer to harvest the hay.

SCS also helped Prentice plan a two-row windbreak of scotch pine and blue spruce that can serve as an evergreen screen along the residential sides of the area to the west and north.

Last April, Scoutmaster Tom Chatman and his troop of Scouts planted the 1,000 feet of windbreak. The Scouts not only satisfied part of the requirements for earning merit badges in conservation and forestry but also brought some money into their troop's treasury.

The Michigan Fruit Canners' waste water management system is considered one of the most satisfactory water recycling systems in the food processing industry—and it's been approved by the Michigan Water Resources Commission. ♦

A natural classroom

by Vincent J. Price
Information Division, SCS
Washington, D.C.

"A feasibility study made in 1965-66 demonstrated that agriculture is the foremost source of income in this area. And because we are, and must be, responsive to the needs of our community, we carried this feeling of the importance of agriculture with us when we began developing our program."

The speaker was Clem Phipps, first chairman of the Lake Land College Board of Trustees; the program he spoke of was one for development of the 300 acres around the college center into an outdoor classroom with such varied soil conditions and land uses that it will replicate a large number of natural ecosystems in central Illinois.

Lake Land College, in Mattoon, Illinois, one of the state's growing number of community colleges, was founded in 1966; the first buildings were dedicated in September 1971. From the beginning, it was apparent that there would be a heavy concentration on agriculture and the life sciences at the college. Developing the outdoor classroom is a natural consequence.

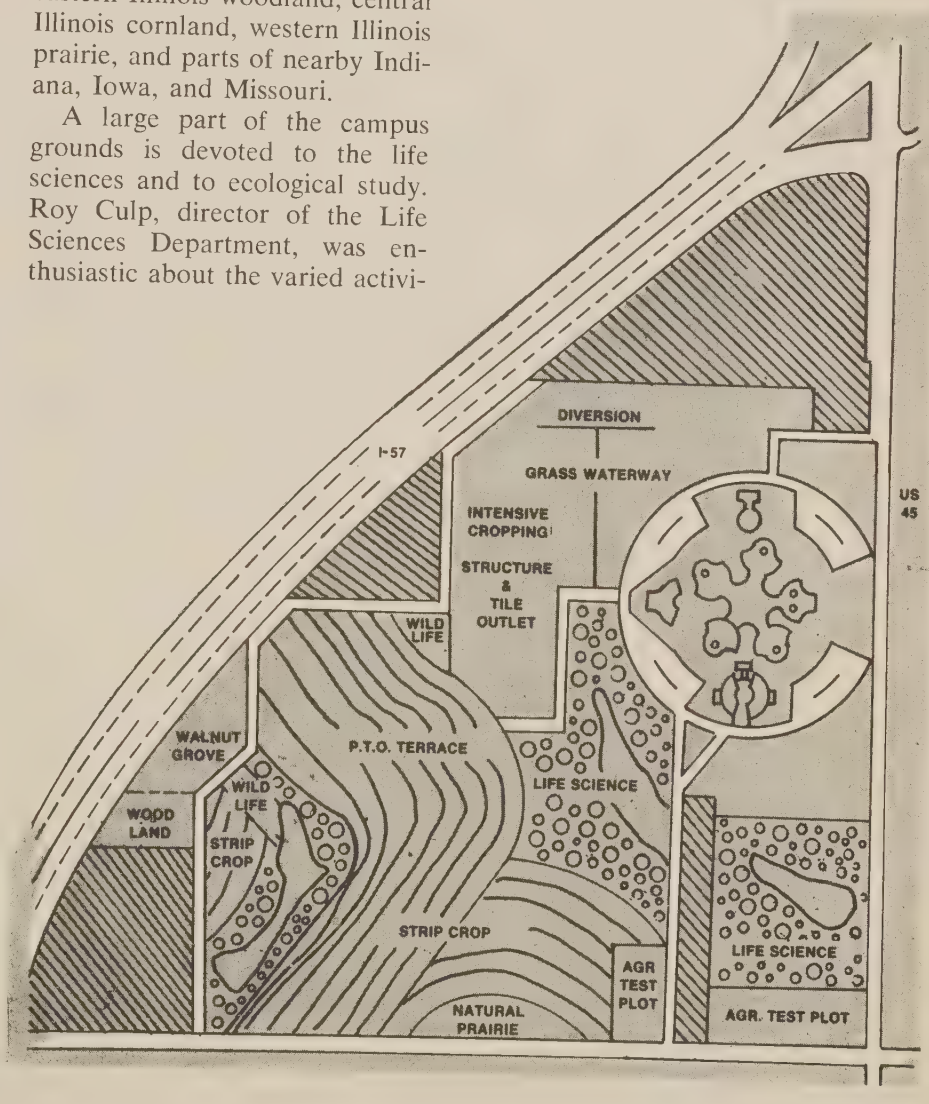
Local leaders fought for early development of the outdoor site. The Soil Conservation Service's district conservationist, J. K. "Pete" Johnson, reported, "The president of the college, Virgil Judge, has a conservation plan on his own farm. He, along with men like Robert Gale Baker, chairman of the Coles County Soil and Water Conservation District, and Clem Phipps, pushed very hard for this project."

Lake Land College has some built-in advantages for its outdoor classroom. William Rich, head of the Agriculture Department, explained, "We're right square on the edge of the terminal moraine and Wisconsin glaciation area, so there are 15 major types of soil here."

These soils include some that are typical of those that underlay eastern Illinois woodland, central Illinois cornland, western Illinois prairie, and parts of nearby Indiana, Iowa, and Missouri.

A large part of the campus grounds is devoted to the life sciences and to ecological study. Roy Culp, director of the Life Sciences Department, was enthusiastic about the varied activities that the site development will open up:

"The area around the small lake south of the college center has been planted to native Illinois trees and made parklike. It will be used for tree identification. We're planning trails through the area with certain species identi-





Roy Culp (left), of the Life Sciences Department, Lake Land College, and J. K. Johnson, SCS district conservationist, inspect an area in the college's outdoor classroom where native grasses were seeded for study by the students.

fied so that students can go through the area on their own.

"The woodland area on the extreme western part of the campus will be kept in its natural state.

"The life sciences area around the upper lake will have three different types of wildlife vegetation —pine grove, grassland, and deciduous forest. Students will be able to study and compare different wildlife systems—the differences in birds and insects, for example, which are caused by differences in vegetation.

"In our prairie area we're trying to redevelop the original native prairie grasses.

"We're stocking our lakes. The upper lake has been stocked with 400 large-mouthed bass, 2,000 bluegill, and 2,000 red ear sunfish. The lower lake has 200 bass, 1,000 bluegill, and 1,000 sunfish.

"In the lower lake other native fish will be added—as an illustrative contrast to the upper lake. Fishing will be encouraged, but we'll keep a record of the catches. The record will be valuable.

"We have two catch basins in the upper lake and facilities to measure phosphates and nitrates in the water. Later on we may get equipment for measuring herbicides and other chemicals."

Besides the life sciences land, there is an extensive area devoted to various forms of agricultural production and conservation practices.

"We have corn and alfalfa stripcropping in one area, and terracing in another," explained the director of site development, Ed Dunphy.

"We will try different agriculture and conservation techniques on this land. We don't intend to do research as such but take proven techniques and apply them to the particular conditions we have here. For example, we'll try minimum tillage.

"We also have an area that will be put into very intensive cultivation, and another one reserved for agricultural testing."

Then there is the walnut grove.

"The purpose of the walnut grove," explained Roy Culp, "is to show the farmer that a piece of land unprofitable for corn or other crops might be profitable for something such as trees."

The walnut grove is just one example of the stress Lake Land College places on diversity of land use on the farm. William Rich sees the life sciences area as another demonstration of the value of diversity: "Wildlife areas or prairie areas should be in-

corporated into a farm plan. We would like to demonstrate to farmers that they can use that odd corner, or that creek bank, or that fence area."

Perhaps the most impressive aspect of the Lake Land outdoor classroom program is that every area seems to have double or triple value and use.

Rich suggested that "our physical education department can utilize the site for outdoor recreation."

Architectural surveying and civil engineering students can make use of the outdoor classroom, and "even our marketing and economics people can benefit," as Ed Dunphy pointed out.

Development of the site is not yet complete. "It'll be 10 years before you see anything very dramatic in the woodland area," Dunphy reported, "but I think 5 years will make quite a difference."

But the development of the outdoor site, like the construction of the college center, is proceeding apace.

"It's a cooperative effort," Rich said. "Eastern Illinois University, the University of Illinois Cooperative Extension Service, the Soil Conservation Service, and the Illinois Department of Conservation's Divisions of Forestry, Fisheries, and Game Management all helped tremendously."

Pete Johnson provided the bulk of SCS assistance. "We worked hand in hand with the college," Johnson reported. "SCS designed the lakes, the terraces, and the stripcropping. We helped the college develop a conservation plan, made the soil and topographic surveys, recommended sites for the tree plantings and the wildlife areas, and suggested seeding mixtures."

Johnson is excited about the outdoor program at Lake Land College; it's an enthusiasm that just about everyone in the area seems to share. This enthusiasm is probably the surest sign that Lake Land College is indeed "responsive to the needs of this community." ♦



Second semester surveying—the outdoor classroom accommodates all kinds of study.

Selecting suitable sites for schools

by Ron Estepp
Soil scientist, SCS
Moorefield, West Virginia

Whatever the school needs of a community may be, in too many instances sites for new schools are chosen and the buildings completed without any thought being given to what lies just inches beneath the surface, or without considering what effects surface water runoff and drainage patterns will have on parking lots, basements, playgrounds, and athletic fields.

School administrators in Jefferson County, West Virginia, found the help they needed in avoiding school site problems when the Eastern Panhandle Soil Conservation District offered its services in selecting sites for four new schools.

The Soil Conservation Service provided soil reports and helped with needed onsite inventories of the natural resources.

Site selection problems are compounded for educators. Not only must they look for favorable soil conditions, they must also consider geographic and demographic factors and costs.

Harold Pickens, Superintendent of Schools in Jefferson County, explained, "We pick three or four possible sites for each school on the basis of location, density, and projected growth of population. We also consider transportation, esthetics, size, and costs. The architect then considers such factors as soil reports before the final site is selected."

Many counties in West Virginia approach school site selection in somewhat the same manner. In Mason County, the Board of Education had considered four possible sites for two new schools. Before making the final selections, the Assistant Superintendent of Schools and an SCS soil scientist evaluated each site. One site was quickly eliminated because of drainage problems. The final selection of two suitable sites was made after a thorough investigation of potential soil and water problems.

Soil scientists can spot potential trouble areas that are not readily visible to the untrained eye. For example, a seasonal high water table is common in many areas, but during dry summer months there may be no evidence of problems. The soil scientist



Soil information available to school boards and administrators in every community can help identify potential problem areas that may result in flood or drainage damage to schools after construction is completed.

Physical education classes combine exercise and conservation by picking up large rocks in preparation for shaping and seeding the area to soil-holding grasses.



looks for signs of mottling, which tell him that during wet months, as the water table rises, there will likely be wet basements and wet or ponded play areas.

Depth to bedrock and types of bedrock are other important factors to consider in avoiding potential trouble and expense. Excavation and construction costs can increase considerably if the bedrock is near the surface.

Costs can also increase if the selected site is steep and needs to be leveled. In some instances, schools have bypassed steep sites for level flood plains where construction is easier and cheaper, but one hazard has simply been replaced by another.

Soil scientists can also pinpoint erosion hazards and suggest precautionary measures. They can determine whether or not a site is susceptible to land slips, and they can check the soil permeability, which is critical in onsite sewage disposal. By knowing about the soil, costly mistakes and health hazards can be avoided.

A good way to save money in developing school sites is to plan measures for controlling surface water runoff before construction begins. And it is much cheaper to install necessary drainage systems during construction than after the buildings have been completed.

At three locations in West Virginia, the added cost of eliminating surface water after construction came to more than $3,000 for each site. In one place, water draining from a 100-acre watershed ended up on the schoolyard every rainy season because an access road diverted all the water onto the school site. The result was a series of small floods that damaged the school building.

In addition to using soil reports in selecting school sites, Jefferson County is using soil information to develop an outdoor conservation classroom on each new site.

"We keep the bulldozers out of the outdoor classrooms," said Superintendent Pickens. "We want to keep those areas in their natural condition."

A learning laboratory developed around a marsh is being planned for the Shepherdstown Elementary School and for students from nearby Shepherd College. The college will use the area to train future teachers in the use of outdoor classrooms for environmental and conservation studies. The plan for the marsh area, developed with the help of SCS, calls for a boardwalk to provide easy access to study areas without damaging the soil and plants.

West Virginia educators are convinced that soil information is essential in selecting school sites. Not only are they able to reduce costs in some instances, but also the students are better served by having outdoor study areas and dry playgrounds. Planning doesn't start with buildings; it starts with the soil that supports them. ♦





Before and after scene at an elementary school in Harrisville, West Virginia, where grass was planted by students to stabilize the soil on a play area slope. The grassed waterway at the edge of the hard-surfaced area carries runoff safely away from the playground.

Conservation campus

by James E. Callahan
RC&D project coordinator, SCS
Mount Vernon, Missouri

Schools, including colleges and universities, in many places are turning their grounds and campuses into environmental learning areas with help from resource conservation and development (RC&D) projects.

RC&D projects are administered by the Soil Conservation Service for the U.S. Department of Agriculture. They are designed to help local people improve the social and economic conditions in the project area by developing and utilizing to the fullest extent the area's resources.

RC&D project leaders throughout the country are recognizing schools as important community resources.

At Missouri Southern State College, near Joplin, college administrators, RC&D officials, faculty members, and students had a part in developing a campus conservation plan to protect natural resources on the 310-acre campus and at the same time offer firsthand conservation learning opportunities for 3,200 students.

The conservation plan has brought about many improvements. For example, water runoff from roofs and parking lots that once cut gullies down a steep bluff flanking many of the campus buildings is now intercepted and diverted into a grassed waterway that safely carries it into nearby Turkey Creek. And eroding banks along the creek have been turned into wildlife management areas by planting soil-holding trees and shrubs that also serve as food and shelter for wildlife. Other critically eroding areas have been seeded to 'Emerald' crownvetch and fescue.

Because the campus occupies almost the entire land area of a small watershed, students, as well as teachers who are enrolled in environmental education summer workshops, can study watershed resource management right on their own campus.

A unique study area that includes a half-acre spring-fed, cold-water pond, which slowly overflows into a 5-acre warm-water marsh, also provides opportunities for on-campus studies of plants and animals native to the cold- and warm-water habitats of southwestern Missouri.

The pond was once a spring-fed swimming pool on the estate of Frank Carmany Wallower, an early pioneer in the lead and zinc mining industry in Missouri. By the time the college acquired the estate, undercurrents from the spring had created "blow outs" beneath the abandoned swimming pool, blocking the water flow and creating erosion problems and dangerous swampy areas. Furthermore, according to Dr. Leon Billingsly, president of MSSC, "the old pool was polluted and a blemish on our new campus."

Igneous, sedimentary, and metamorphic rocks will be placed around the pond to stabilize the banks and outlet and to provide opportunities for geological studies. A border planting of trees and shrubs around the pond and marsh will eventually help abate wind and noise. The effectiveness of these windbreaks will be determined and measured over the years by MSSC students.

The pond area alone is "invaluable," according to Dr. Gerald Elick, assistant professor of biology. "It is an ever-present teaching aid within a few hundred



(Left) They start young to learn about conservation on the Missouri Southern College campus where SCS helped develop a conservation plan that includes many study sites for future teachers, biology and geology students, and the entire community.
(Below) Biology students gather laboratory specimens from a pond developed near the site of an abandoned swimming pool on the Missouri Southern campus. The conservation learning area on the campus was developed with help from RC&D project leaders.



feet of every classroom on campus."

Technical help in developing and implementing the campus conservation plan was provided through the Southwest Missouri RC&D Project by the Soil Conservation Service, the Jasper County Soil and Water Conservation District with which the college is a cooperator, the Missouri Department of Conservation, and the Missouri Extension Service.

Helping schools and colleges tie together sound land use and educational opportunities brings RC&D project leaders closer to the goal of properly developing, utilizing, and conserving the natural resources of their area for the benefit of the people. ♦

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D. C. 20401

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300
AGR 101

POSTAGE AND FEES PAID
U. S. GOVERNMENT PRINTING OFFICE

Review

Soil surveys

Arkansas

Ouachita County. By Vernon R. Catlett. *1973. Soil Conservation Service in cooperation with Arkansas Agricultural Experiment Station. 61 pp., illus.; maps.*

Indiana

Spencer County. By H. F. Williamson and J. L. Shively. *1973. Soil Conservation Service in cooperation with Purdue University Agricultural Experiment Station. 79 pp., illus.; maps.*

Iowa

Crawford County. By John A. Kovar, Raymond I. Dideriksen, and Charles S. Fisher. *1973. Soil Conservation Service in cooperation with Iowa Agricultural and Home Economics Experiment Station. 61 pp., illus.; maps.*

Kansas

Sherman County. By Raymond C. Angell, Charles F. Youberg, Elbert L. Bell, and James S. Hagihara. *1973. Soil Conservation Service in cooperation with Kansas Agricultural Experiment Station. 47 pp., illus.; maps.*

Kentucky

Grayson County. By Orville J. Whitaker, Frank R. Cox, Jr., Henry T. Converse, Jr., John L. Taylor, Jacob V. Bentley, Jr., and Eullas H. Jacobs. *1972. Soil Conservation Service in cooperation with Kentucky Agricultural Experiment Station. 81 pp., illus.; maps.*

Madison County. By John H. Newton, Herman P. McDonald, Darwin G. Preston, Alfred J. Richardson, and Raymond P. Sims. *1973. Soil Conservation Service in cooperation with Kentucky Agricultural Experiment Station. 103 pp., illus.; maps.*

Maryland

Anne Arundel County. By Robert M. Kirby and Earl D. Matthews. *1973. Soil Conservation Service in cooperation with Maryland Agricultural Experiment Station. 127 pp., illus.; maps.*

Meetings

October

- 1–8 Agency for International Development Water Management Symposium, Park City, Utah
- 4–5 American Forest Institute, Portland, Oreg.
- 6–7 Sierra Club, Wilderness Conference, Boulder, Colo.
- 6–10 American Bankers Association, Chicago, Ill.
- 7–10 American Forestry Association, Lake Placid, N.Y.
- 7–10 Farm and Industrial Equipment Institute, Atlanta, Ga.
- 7–12 SCS State Conservationists Annual Meeting, Lake Tahoe, Nev.
- 9–13 National Conference of Editorial Writers, Honolulu, Hawaii
- 11–14 National Association of Biology Teachers, St. Louis, Mo.
- 14–17 Southeastern Association Game and Fish Commissioners Annual Meeting, Hot Springs, Ark.
- 16–19 National Future Farmers of America, Kansas City, Mo.
- 21–24 American Chamber of Commerce Executives, Cincinnati, Ohio
- 21–25 American Institute of Planners, Atlanta, Ga.
- 21–25 Association of Official Seed Certifying Agencies, Detroit, Mich.
- 21–26 American Water Resources Conference, Seattle, Wash.
- 22–24 Urban Land Institute, Lake Tahoe, Nev.
- 22–25 Second International Pollution Engineering Congress and Exposition, Philadelphia, Pa.
- 22–26 Association of Engineering Geologists, Los Angeles, Calif.
- 28–30 Southeastern Agricultural Chemicals Association, Pine Mountain, Ga.
- 28–Nov. 1 Adult Education Association of the USA, Dallas, Texas
- 29–31 American Plywood Association, Atlanta, Ga.

S035
v.2

PERIOD. READ. RM.

SOIL conservation

U. S. Department of Agriculture / Soil Conservation Service / October 1973



U.S. DEPT. OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY
RECEIVED
DEC 3 1973
PROCUREMENT SECTION
CURRENT SERIAL RECORDS

The shadow cast by trees

It is almost a year since "Tree Time USA" was proclaimed by the American Forestry Association at its National Tree Planting Conference in New Orleans. The ambitious goal outlined in that proclamation is to plant 40 million acres of trees during the next 10 years.

The Soil Conservation Service is cooperating wholeheartedly. We have increased the emphasis on tree planting as part of our total responsibility. We are working to encourage the planting of 5 million acres of trees in the next 10 years by conservation district cooperators.

This too is an ambitious goal. And it's an expensive one. But it's important, because the demands made on woodland products and forested areas are increasing.

Trees do more than provide wood, paper, and other products. They are a home, or source of food, for many wild animals. They help hold the soil in place and add beauty to the environment. And they are a valuable aspect of many recreation areas.

About 59 percent of all forest land in the nation is held by about four million private landowners in amounts ranging from a few acres to four or five thousand acres.

Some of the woodland-for-wood has been mismanaged, and is producing only half its annual timber production potential. Other privately owned wooded areas could be improved for such uses as wildlife, erosion control, and recreation. Often, two or more uses can be combined if the owner desires this and knows how to accomplish it.

SCS people, with their "delivery system" of technical service to private landowners, can provide help with tree planting, restocking, thinning, and other silvicultural improvements. This work is carried out through conservation districts and is coordinated with the work of other federal agencies and state forestry agencies.

Trees cast a good shadow on the land. Let's continue to keep them green and growing for many purposes.

Kenneth E. Grant

SOIL conservation

October 1973, Vol. 39, No. 3

Contents

2 From the Administrator
4 A tree farm revisited
by Carrow T. Prout, Jr.
7 Help thy neighbor
by Christine Johnson
8 Arkansas: trees no crowd
by Max D. Bolar
10 Thinking thin
by Richard S. Bainbridge
12 In search of the American chestnut
by Vincent J. Price
16 Drying up that Mississippi mud
by Pam McPhail
18 A winner picks a winner
by Fred Trump
20 The sweep of sage or a sea of grass
by Dan S. Budd
22 Recon
23 Review
23 Meetings

COVER: A dead sentinel in the Blue Ridge Mountains stands silent—a witness to the devastation of blight on American chestnut trees. See "In search of the American chestnut" on page 12. (U.S. Forest Service photograph)

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

EARL L. BUTZ, Secretary of Agriculture.

KENNETH E. GRANT, Administrator, Soil Conservation Service

PHILLIP A. CHAVEZ, Editor

MARYELLEN BERTRAM, Editorial Assistant

SOIL CONSERVATION, the official magazine of the Soil Conservation Service, is published monthly by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. Use of funds for printing this publication approved by the Director of the Office of Management and Budget, July 17, 1973.

Reprint permission: Contents of this magazine may be reprinted without permission. Credit is not required but is appreciated. Photographs are available on request.

Commercial names: Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscription: $3.50 per year, $4.50 foreign. Single copy, 45 cents. Discount of 25 percent on orders of 100 or more sent to same address. Order direct from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

A tree farm revisited

by Carrow T. Prout, Jr.
Chief forester, SCS
Washington, D.C.

There's a tree farm in Fairmont, West Virginia, that has special significance for me. It was on that farm, back in 1961, that I helped demonstrate woodland conservation planning to other Soil Conservation Service people in West Virginia.

In woodland conservation planning, you give the owner a rundown on the kinds of soil he has on his farm, the potential of the soil for growing trees, and the hazards and limitations involved in managing the land for woodland purposes. Next you present alternatives and the various possibilities that can lead to good woodland use, and then you help the owner develop a plan for his land based on his own particular needs or desires.

That is what we did that day back in 1961. Armed with a soils map of the farm and an aerial photograph of the area, I accompanied Jim Crawford, the owner; Ross Mellinger, who was then the SCS forester for West Virginia; Don Hebb, a forester with the West Virginia Department of Natural Resources; and Law Helmick, then the SCS district conservationist in Fairmont, in a walk over the woodlands.

We discussed the soils, the kinds of trees that were growing, and the things Crawford could do to harvest a good timber crop and gradually improve and conserve his woodlands.

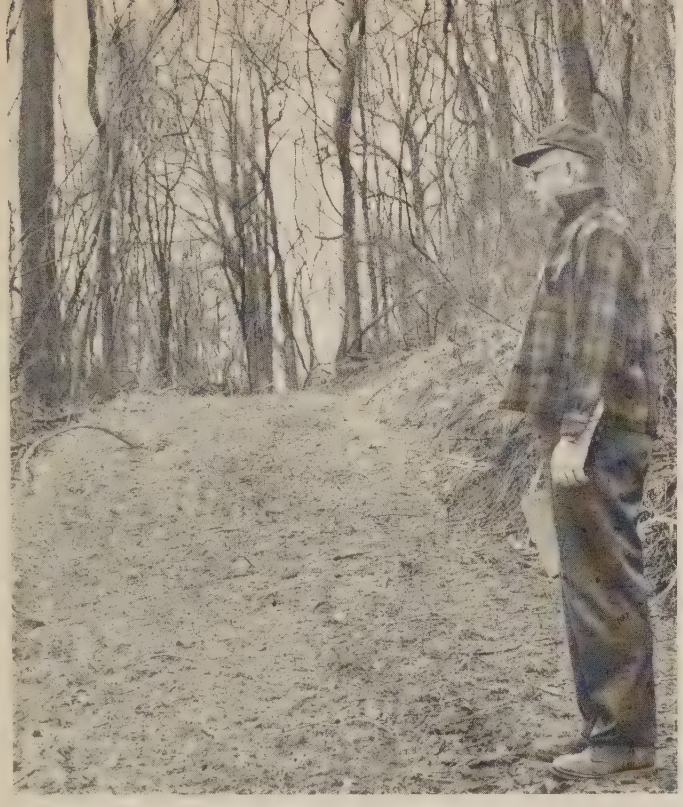
This year, after 12 years, I revisited Jim Crawford's tree farm. Crawford had been named West Virginia's Tree Farmer of the Year in 1971, so I was anxious to see what he had done with his woodlands since 1961.

The Crawford farm is snuggled back into the hills just out of Fairmont. It is a combination farm—part of the land is in pasture and hay crops and the rest in timber.

Bill, Crawford's 14-year-old son, and Fannie, the family collie, joined Crawford and me as we



The Tree Farm sign in front of Jim Crawford's house tells passers-by that Crawford is doing an excellent job in tree farming. Pictured with Crawford are his son, Bill, and the family collie.





(Left) The Soil Conservation Service helped with the layout of the many access roads on the Crawford tree farm. Harry Summers, Jr., SCS soil conservationist at Fairmont, West Virginia, takes a look at a newly constructed road.
(Right) Jim Crawford watches as John Gorman, SCS forester for West Virginia, counts the annual growth rings on an increment core from one of Crawford's yellow poplars.

walked along one of the many access roads on the farm that were laid out with SCS help. The grade of the roads is not too steep, so erosion is kept to a minimum. Also, all parts of the tree farm can be reached from the access roads.

In 1961, we had pointed out to Crawford that properly spacing trees would allow them to grow about 2 inches in diameter in 8 years. And with proper thinning, Crawford could cut timber at 8-year intervals.

Crawford followed up on our recommendations and divided his woodlands into four units. He harvests timber at 2-year intervals—one unit at a time. Thus, in 8 years his entire tree crop has been harvested.

We visited the first block or unit of timber that he had worked on. He had thinned one patch of young yellow poplar, and we looked at the results. An increment borer revealed that the trees remaining after thinning were performing nicely. There were eight rings to the inch.

On the rest of that first unit he had harvested timber in 1962. Where the trees were still immature, he had selectively cut the timber.

There were spots where the trees were mature, or scattered, or unmerchantable. Here Crawford clearcut small openings. We had explained to him back in 1961 that this kind of cutting served three purposes. First, it removed the trees that were mature, either by virtue or old age, and would not improve any more in value. Second, it created openings so young trees could be established, thus insuring all ages of timber in the same area. And third, these clearcut areas grow up in brush, along with desirable tree seedlings, making good wildlife food and cover.

We suggested to Crawford that he open a few acres each time he cut to encourage yellow poplar. The poplar was coming into the openings.

In one or two of the areas that Crawford had clearcut, large unmerchantable trees had been retarding the growth of desirable trees around them. These Crawford girdled and killed. Their usefulness did not end, however, because woodpeckers built their nests in those trees and squirrels made their homes in the tree hollows, which is one of the reasons why the trees were unmerchantable.



Gorman and Crawford measure the yellow poplar designated by West Virginia University as a superior tree and selected for use as a source of improved tree planting stock in West Virginia.

The remaining trees and the maze of brush and briars that grew into the openings along with the young tree seedlings provided browse and cover for deer, nesting places for birds, and homes for other wildlife.

I remembered an open field that in 1961 was more or less used as a pasture. It had begun to grow up in brush for the very simple reason that it was too far from the homestead to be managed intensively as a pasture and too steep and rough for the efficient use of farm machinery. We had talked about planting trees there.

We went to see that field. In 1965 or 1966, Crawford planted yellow poplar and white pine there. The yellow poplar today are 8 to 10 feet tall, growing nicely and beginning to overcome the briars and other brushy plants. Planting the white pine was Crawford's idea, and a good one. The trees are excellent cover for deer and other wildlife on the farm.

A new highway winding its way through the hills had taken several acres of Crawford's pasture land. Crawford used the money he received for that land as part of the payment for an additional 200 acres of forest land adjoining his farm.

We walked over to take a look at the new acquisition. I found thick stands of young poplar vigorously growing and just waiting for the love and tender care that a man like Jim Crawford can give them. There were many acres of large timber too—excellent stands of yellow poplar, in fact, they were superior stands.

West Virginia University, in looking for outstanding groves of yellow poplar and superior yellow poplar trees, had visited Crawford's farm and designated one of the newly acquired yellow poplars as a superior tree. Scions were taken from the tree to establish a seed orchard of superior yellow poplar trees for planting throughout West Virginia.

Jim Crawford listened well that day in 1961. He recognized the needs of his place for woodland conservation and developed a very workable plan. Most important of all, he is carrying out his plan and intends to continue working his woods according to the plan, modifying it as conditions change.

From my standpoint, seeing an individual put the philosophy of woodland conservation into action is a very satisfying experience and the ultimate of rewards to a forester. ♦

Help thy neighbor

by Christine Johnson
Correspondent, The Missoulian
Missoula, Montana

In frontier times a barn-raising was a community project—neighbors worked together to get a job done.

Many people feel that this "help your neighbor" spirit is dead and gone, but Clarence Neuman of Hamilton, Montana, can testify that it is alive and well in the area covered by the Bitter Root Resource Conservation and Development Project.

The Bitter Root RC&D Project spearheaded a program to rebuild a flood-destroyed bridge on the edge of Neuman's property. Neuman had neither the physical strength to do the work himself —because of a disabling kidney ailment—nor the money to have it done.

The Bitter Root RC&D brings together people from three counties to discuss and solve community problems. It's aims are to use, protect, and develop the area's natural and human resources and thus strengthen the economy and increase opportunities for good living.

The county commissioners of Mineral, Missoula, and Ravalli Counties and the conservation districts in those counties sponsor the RC&D project.

Bill Whittecar is typical of the men and women who are active in the project. He is a retired businessman whose know-how and interest in community affairs keeps him as busy as he ever was in his preretirement days.

When someone suggested to an RC&D committee that rebuilding Neuman's bridge might be a worthy project, Whittecar became the guiding force.

After weeks of telephoning and visiting potential helpers, Whittecar got the technical and financial help needed to do the work.

The Bitterroot Conservation District did the necessary surveying, and the Trapper Creek Job Corps provided labor as part of its vocational training program. Logs and other materials were donated by the U.S. Department of Agriculture's Forest Service, Ravalli County, and interested people. A local sawmill cut the logs, and a service station owner volunteered to haul them to the bridge site. Various service clubs, businesses, the Hamilton Chamber of Commerce, and neighbors provided noon meals for the Job Corps men while they worked.

Whittecar commented that he had never seen so many local groups working together on a project.

And the work goes on.

In other RC&D activities in Ravalli County, small industries using wood wastes have been started, including a bark-for-bedding industry that was granted a $72,000 loan from the Small Business Administration. The county's successful can-recycling drive started with a letter from an RC&D committee to the Anaconda Co.

In Missoula County a large group of people worked on developing greenbelts and recreational areas along the five rivers that branch out of the city of Missoula. The city farmers' market, another RC&D activity, is finishing a sucessful season.

In Mineral County a sanitary landfill has been started.

Local people think of the Bitter Root RC&D Project as providing both opportunity and a challenge—an opportunity to come up with new and worthwhile ideas and a challenge in following through. Therefore, they believe that the success or failure of any RC&D activity, whether building a new bridge or finding a new use for wood chips, rests squarely on their shoulders. ♦

The Bitter Root Resource Conservation and Development Project spearheaded the rebuilding of a flood-destroyed bridge. Trapper Creek Job Corpsmen provided the labor as part of their training program.



Arkansas: trees no crowd

by Max D. Bolar
Forester, SCS
Little Rock, Arkansas

When is an orchard not an orchard? When it's a hayfield—at least in Arkansas where tree planting across the state last March highlighted a program to stimulate multicropping: black walnuts with clean-tilled crops, hay, and pasture.

A lot of hopes are riding on the trial plantings. Walnut shelling companies hope to open up new sources of cultured nuts to improve their product and increase their output. Cooperating farmers hope to supplement their income by grossing an additional $100 an acre. Consumers stand to benefit by finding superior walnuts on the supermarket shelf, at prices they can afford. And manufacturers of veneer and other wood products will eventually have an increased supply of a wood that is fast becoming scarce.

The walnut program began in the fall of 1971 with a series of workshops conducted for Soil Conservation Service people and interested landowners. Conducting the workshops were representatives of two walnut shelling companies, the Hammons Products Company of Stockton, Missouri, and the Gravette Shelling Company of Gravette, Arkansas.

Wide spacing is the key to the program, the representatives explained. The walnut is not a dense shading tree, and with 40- by 40-foot spacing, not only can a second land use be maintained between the trees, but also the trees grow faster and produce abundant nut crops.

On some of the best soils a 21-inch sawlog may be produced in 35 years. The company representatives admitted that nut production figures are less certain but suggested that an annual yield of 100 pounds of nuts per tree is possible. At 4 cents a pound, 27 trees could gross $108 an acre.

Several factors combine to make black walnuts suddenly more interesting. Four cents a pound isn't likely to stimulate excessive interest in the hard work of nut production and harvesting. Now, however, prospective multicroppers face the reassuring prospect of greater nut production per tree, new mechanical or semimechanical methods of nut collection, and a better price.

Nuts can do for walnut trees what pulpwood has done for pine trees, the representatives explained. They can provide a backup product to sawlogs, making the total investment profitable.

Part of the companies' interest in walnut grove multicropping stems from the superior quality of cultured nuts compared to common nuts. Cultured nuts tend to be plumper and have high-quality white meat; common nuts have a greater percentage of amber meat. Cultured nuts produce 14 to 20 pounds of meat per 100 pounds of nuts; common nuts average only 8 to 10 pounds per hundred. The shelling companies not only prefer cultured nuts but pay more for them.

Based on what they learned at the workshops, 34 Arkansas landowners in 25 soil conservation districts decided to try black walnut multicropping. The Hammons Products Company donated 4,200 1-year-old seedlings of superior trees to participating soil conservation districts. And to assist in planting the seedlings, the Gravette Shelling Company loaned two 14-inch soil augers to be hitched to tractors. About 1,800 additional trees were purchased from the Arkansas State Forest Commission Nursery.

Planting of the 6,000 walnuts took 5 weeks. SCS helped, as did FHA, ASCS, USDA's Forest Service, the Arkansas Forest Service, the Extension Service, and vocational-ag groups.

In 1973, more than 19,000 walnut seedlings were planted on more than 600 acres belonging to 85 different landowners in 35 soil conservation districts.

In the tree planting operation, an engineering flag is placed at each planting site before planting begins. Each time a tree is planted, planting crews place a canvas blanket over the site. The blanket has a hole in the center, exposing the exact planting position.

The 14-inch augers bore 30-inch-deep holes to receive the trees. About half of the soil is immediately kicked back into each hole and tamped—this helps

stimulate root development and moisture storage.

Next in the planting operation, a volunteer gets down into the hole and holds the walnut seedling, which has a 14- to 17-inch root system, while the blanket crew of two or three men funnel the remaining soil back down through the hole in the blanket. The tree holder has to step lively to avoid being buried up to his knees by the blanket crew.

The crew moves on to the next flag while someone places a length of stove pipe over the planted seedling and sprays an area 4 feet in diameter around the pipe. The spray mixture eliminates grass and weed competition

After that, the trees are on their own.

For a time, all the landowners can continue their present land use. But in 6 to 8 years, the canopy from the trees will make soybean production and other tilled cropping difficult, and the land use will change, perhaps to pasture or hayland.

Most of the land planted in the program is already in hay, so no dramatic land use changes are expected. Rather, the walnut industry will be something over and above the present use of the land.

Because the walnut root system is deep, it will not compete with hay for nutrients in the soil. So the cows lose nothing, and the landowners, the walnut industry, and the consumer all stand to gain. ♦



Drilling 30-inch-deep holes is the first step in walnut tree planting.





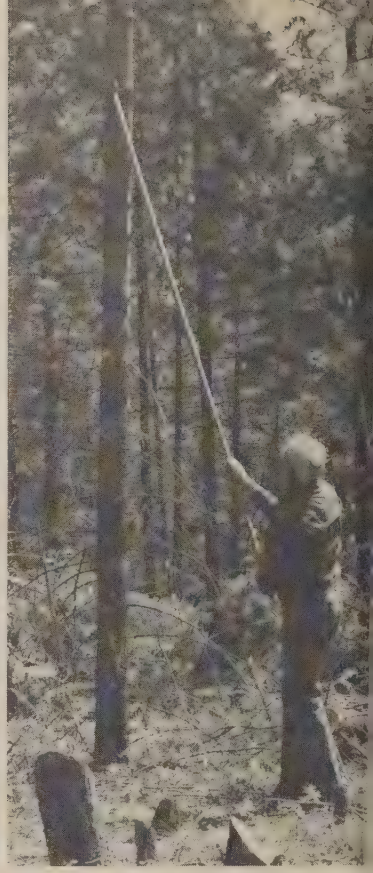
(Left) Hays Beard, SCS area conservationist, holding a walnut seedling, does some fancy footwork to avoid being planted himself. (Right) Buck Harris, a cooperator with the Boone County Soil Conservation District, sprays around a planted seedling. The stovepipe protects the seedling during the spraying operation.

Thinking thin

by Richard S. Bainbridge
Soil conservationist, SCS
Bellingham, Washington







An unusual event every spring in north central Washington has all the flavor of an Iowa picnic.

At noon, men, women, and children laugh and talk as they relax and eat salad and sandwiches under trees along a brook.

In the evening, a festive beef dinner is followed by speeches and entertainment.

But for hours in the morning and afternoon the sounds are of work, not play.

The purpose of the outing is to thin dense stands of trees. And the end result is getting multiple use of the land—trees, livestock, and wildlife.

In recent years the work force has swelled from an original handful to nearly 400 people. But more important than numbers is the fact that sportsmen and cattlemen, local, state, and federal agencies, as well as public land users are represented on the force.

It all started more than 20 years ago: the Washington State Association of Soil and Water Conservation Districts asked the South Okanogan Soil Conservation District to develop ways of getting conservation and good land use practices applied on public lands. The district supervisors organized committees to inventory resource problem areas and to propose solutions.

One committee included representatives from the Omak Fish and Game Club and the Chiliwist, Loup Loup, and Ruby Cattlemen's Associations; the other included people from the Soil Conservation Service, the State Department of Natural Resources, and the State Department of Game.

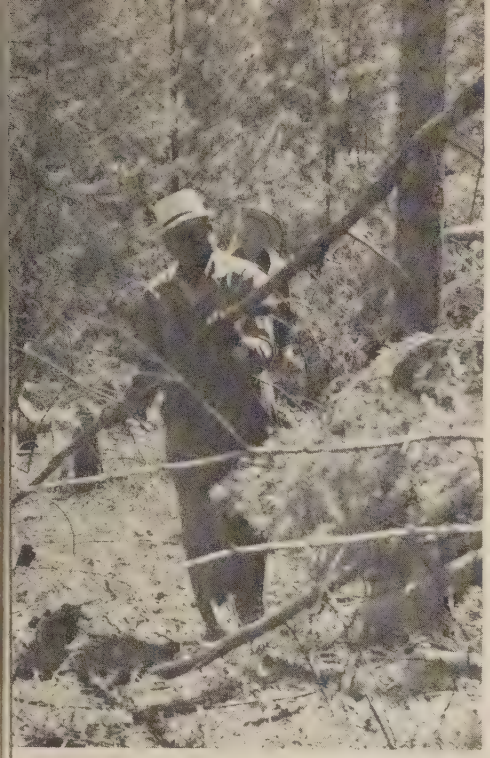
Out of these committees evolved the annual outings to correct resource problems on public lands. In 1958, 12 men turned out on a day in spring to develop a fenced watering facility for wildlife and livestock.

The following year, 18 men turned out, again, to improve public areas for wildlife.

Four sportsmen's clubs in King County began taking an active part in the annual project. Then seven more groups in the county joined in: Association of Northwest Steelheaders, Izaak Walton League, Lake City Sportsmen's Club, Washington Game Bird Club, Poggie Club, Boeing Rod and Reel, and Issaquah Sportsmen's Club. Club members were later joined by their junior clubs and women's auxiliaries.

About 6 years ago, the project participants changed their emphasis from wildlife developments to tree thinning. Tree thinning is beneficial to at least four kinds of land use: timber production, watershed capabilities, wildlife feed and habitat, and cattle feed. It also allows grazing in areas that cattle previously could not move through.

Generally, the outings begin early on a Saturday morning. Children clean debris from nearby creeks and work at the





(Left to right) Preparing for a weekend stay at the site of the "tree thinning outing." Small groups with chain saws go into the thickets first. They are followed by pruners and stackers. The end result is a thinned forest, which allows multiple use of the land—trees, livestock, and wildlife.

campground. The women begin to prepare lunch, and the men begin to thin timber.

Areas of state-owned land are set aside for this work. A few men begin cutting out the smaller trees and brush with chain saws. Others follow, piling all downed material into stacks. Stacks that won't burn then are burned in the fall. All areas are seeded to grass with help from the Department of Natural Resources and the Soil Conservation Service.

In the evening, the men join the women and children at the campground for an outdoor barbecue. The cattlemen's associations and the sportsmen's clubs usually alternate in donating the beef and other food.

The remaining work is finished on Sunday morning. Then, their annual weekend of work and fun over, sportsmen, cattlemen, and agency people take down the camp and make ready to return home. Teamwork has paid off once again. ♦



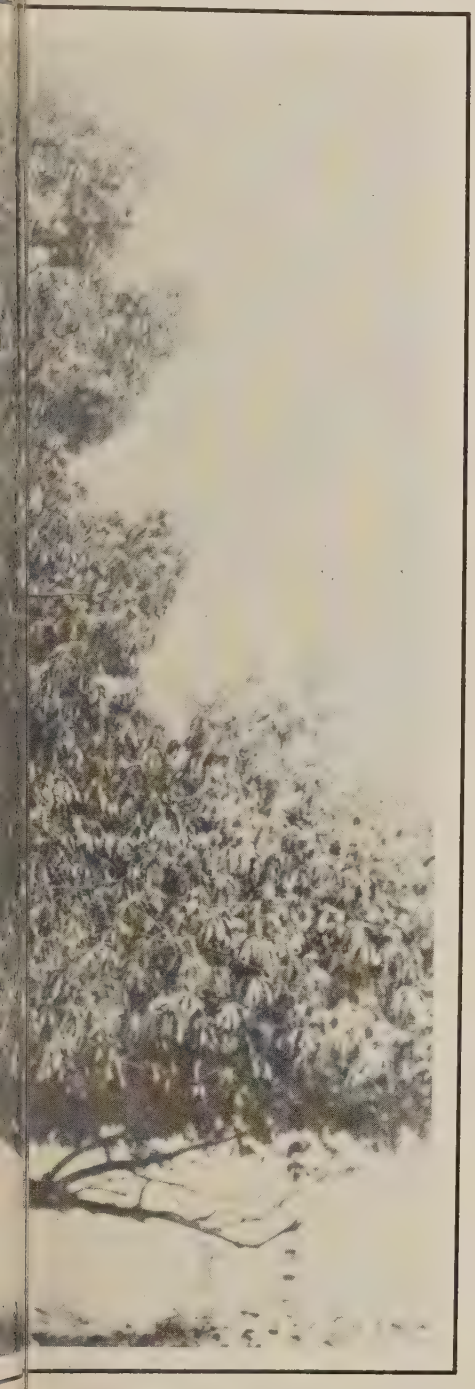
In
AMERICA



In 1915, when this photograph was taken, spreading che
the American chestnut, for all practical purpos

search of the N CHESTNUT

by Vincent J. Price
Information Division, SCS
Washington, D.C.



...s abounded in eastern forests. Today, ...nct. (U.S. Forest Service photograph)

Once the American chestnut tree abounded in eastern forests. Settlers from the earliest times roasted its nuts, a natural part of the New World's bounty. Colonial cabinetmakers prized its wood. American poets admired it: "Under the spreading chestnut tree, The village smithy stands." Naturalists considered the tree among the most stately and beautiful in American forests. And painters of the Hudson River School saw in the strength and natural splendor of the chestnut a symbol of the America of their time.

No more. The American chestnut is now, for all practical purposes, extinct.

A chestnut blight, somehow carried over from Europe in the early 1900's, is responsible. Starting from New York City, the blight devastated chestnuts in the northeast and then swept like wildfire south and west. By the early 1930's the blight had killed almost all American chestnuts.

Almost all, but not quite all.

Scientists all over the East attempted to save the chestnut. The U.S. Department of Agriculture's Forest Service launched an ambitious program in the 1930's to create a hybrid from the American chestnut and the Chinese chestnut. The American has a tall, upright trunk and is a valuable timber tree; the Chinese is squat—more a shrub than a tree—but is highly blight resistant.

Forest Service scientists hoped to come up with an upright blight-resistant tree. But it didn't work out that way. Instead, every hybrid retained the shrubby shape of the Chinese chestnut. Today, the descendents of these hybrids can be found in many states, still looking like Chinese chestnuts: low, shrubby trees without any timber value.

"Many problems extremely difficult to overcome occur in breeding chestnuts," according to Dr. K. R. Shea, Acting Director of the Forest Service's Forest Insect and Disease Research Division. "Resistant parent trees usually are of poor form and not satisfactory as shade or forest trees. Seedlings from crosses of resistant Asiatic with susceptible American chestnuts result in susceptible seedlings, and back crosses to resistant trees must be made. All of this takes time. Furthermore, resistance cannot be fully tested until trees are about 18 years old."

There are a few American chestnuts left today. In an area in the Great Smoky Mountains, at elevations higher than anyplace east of the Rockies, a few trees survive, simply because the blight itself is poorly adapted to the elevation. But these trees are only a handful.

There's a 40-year-old American chestnut in Jackson, New Hampshire. But it's sterile. It bears nuts, but without cross-pollination the nuts will never germinate.

Finally, there are thousands of young American chestnut saplings in eastern forests. Some of these survive long enough to produce nuts, then are blighted and die. Their nuts produce some trees that, in their turn, survive long enough to produce nuts and then die.

"Their death is in no way caused by the fruiting," explained Dave Allen, the Soil Conservation Service's state biologist in New Hampshire. "Many plants, just before they die, throw off one last effort to blossom and fruit. Perhaps it's something like that with the chestnuts."

However that may be, the young chestnut saplings do not survive much more than one blossoming—5 years or so at most, and then the fungus finds them. Yet those few years and few blossomings have managed to keep the species alive, and

might continue indefinitely.

"Give it a hundred thousand years and the American chestnut could be replaced with a blight-resistant strain," explained W. C. Young, the SCS regional plant materials specialist for the South. "Plant breeding could reduce this to a hundred years."

Plant breeding is where the Soil Conservation Service comes in. At several plant materials centers in the South, SCS has attempted to come up with a blight-resistant strain. The first step, the hardest, is to locate a mature American chestnut tree that is blight resistant. The search has been going on for some time.

The search entails a good deal of frustration. For example, a few months ago, the James E. "Bud" Smith Plant Materials Center at Knox City, Texas, received nuts supposedly from a pair of American chestnuts but found out later that the trees had been misidentified and were in reality Chinese chestnuts.

Often a tree is stripped of its nuts by squirrels or local roasted-chestnut enthusiasts before conservationists can collect nuts for propagation.

Then, too, there's the problem of cross-pollination. "We managed to get nuts from a tree in north Alabama," Young recalled, "and planted them at our center in Americus, Georgia. But the entire crop failed to germinate."



A mature American chestnut that is free of the blight is not necessarily blight resistant—perhaps just lucky in avoiding the disease. Carrow T. Prout, Jr., SCS's chief forester, remembers a grove of mature chestnut trees in Maine years ago. "One year we carted bushel-baskets of nuts down to Beltsville, Maryland. We thought we really had something. The next year all those trees in Maine were dead." As far as is known, that was the last American chestnut grove.

Some chestnuts that are quite old have survived the blight but are not blight resistant and are of little use for propagation. This is

Different weapons, the same target: Scientists are taking several different tacks in trying to solve the chestnut blight dilemma.

The University of Connecticut is studying the genetics of the fungus.

Stronghold, Inc., a private organization, is collecting nuts, irradiating them, and releasing them to be planted.

The Forest Service is working with a team of French scientists to develop an antitoxin. The French have developed an isolate which heals the cankers of the blight by killing the fungus. FS scientists in St. Paul, Minnesota, working with isolates obtained from France, hope to determine the responsible virus and find out what makes the strains so different. So far the virus hasn't even been located under an electron microscope. A further problem has been an inability, so far, to get the virus out of the French strains and into the American strains.

Finally, work is still being done in hybridization. Since 1947, the Connecticut Agricultural Experiment Station has sponsored this work, and Professor R. A. Jaynes still carries on the program.

Hopefully, if a blight-resistant strain of American chestnut can't be found, something else—genetic control, biological control, or mutation—can bring back a healthy American chestnut.

so because the American chestnut is a prolific sprouter, and sometimes a tree will grow back up again after being killed to the base by the blight. This can happen several times—the blight killing the tree, and then the roots generating a new sprout, which also is killed. A tree such as this, though it may be 15 years old, is not blight resistant. In addition, such a tree will be misshapen. Eventually, the continued sprouting will exhaust the root system, and the tree will die.

An exciting find by a Tennessee district conservationist has again raised some hopes that a blight-resistant specimen may have been found.

R. L. Dudney, SCS district conservationist in Carthage, Tennessee, was home for Christmas in Jackson County, Tennessee, when he discovered an American chestnut growing in a neighbor's woods. According to Charles M. Henninger, SCS woodland conservationist, "The tree is 13 inches in diameter and 50 feet tall. It has beautiful form. It looks like the chestnut trees I knew when I was boy."

What makes the find so important is that the tree definitely has had the blight but looks as though it has recovered.

The chestnut blight struck the main stem of the tree; there are a series of scars running up the trunk. But beneath the scars, where there ought to be dead wood, the vital cambium tissue is alive.

In March 1973, Dudney, along with Ray Ellis of the Tennessee Division of Forestry, collected cuttings of the tree for grafting and sent them to Dr. Eyvind Thor of the University of Tennessee, who is doing genetic work with chestnuts in the Southeast.

Dudney, who is now retired, and Ellis plan to harvest nuts from the tree and remove competing trees to give the chestnut more growing room. "The owner told us we could do anything we wanted." Dudney reported.

Dudney summarized the reasons for his optimism this way: "The tree has got to be blight resistant now to have lived this long."

Others, who have been frustrated time and again in their attempts to save the chestnut, are less optimistic. "The prospect for the chestnut looks dreary," said plant materials specialist Young, "but this is just the way it is. ♦

Chinquapins too: The chinquapin is a small tree closely related to the American chestnut. Like the chestnut, the chinquapin produces an edible nut in a burr, although the chinquapin nut is only about the size of an acorn. The Alleghany chinquapin was almost totally wiped out by the chestnut blight during the 1920's. The dwarf chinquapin fared better, because it is more resistant to the disease. SCS is working with dwarf chinquapin at plant materials centers in Georgia, Mississippi, and Florida.

(Left) This American chestnut tree, identified by David Allen, an SCS biologist, is growing on a poultry farm in Lee, New Hampshire. The tree is 40 feet tall, vigorous, and bears fruit. (Below) In 1925, these stately young American chestnuts in Virginia promised to provide first-rate timber. Within 10 years the entire forest was dead. (U.S. Forest Service photograph)



HOW YOU CAN HELP

Do you know of a mature, healthy American chestnut tree? If you do, you can help the Soil Conservation Service in its search for a blight-resistant chestnut. Let your local conservation district or the nearest SCS office know about the tree, or write to the woodland conservationist at the SCS state office.

Drying up that Mississippi mud

by Pam McPhail
Staff writer, The Clarksdale Press Register
Clarksdale, Mississippi

Sometimes not even a child's imagination can transpose his play area into a castle or western frontier, especially when in reality he plays in slimy mud filled with anything from broken glass and rusty cans to raw sewage. His world is often inviting only to mosquitoes and rats.

In the area of Deer Park in the northern section of Jonestown, Mississippi, the children play innocently in stagnant water almost year round. The Mose Bayou causes water to back up in the residential area, and because there is no means by which the water can flow away, a large part of the stagnant water remains beneath the houses.

When rainfall in the area is heavy during any given season, the water rises and often forces some families to evacuate, according to James Shanks, Jonestown alderman.

Shanks said that there has always been a problem with drainage in the bayou area of town, but in the past few years the situation has grown worse.

According to Shanks, there were several reasons why the problem had not been corrected. A lack of money in the town was one of the main ones—approximately 80 percent of the population is on welfare. The town's sewer project, now in the process of being completed, cost more than $800,000. Without the help of federal and state agencies the town could not possibly have afforded that system.

Unfortunately the sewer system will not correct the drainage problem caused by the Mose Bayou. But a project launched by Jonestown and the Northwest Resource Conservation and Development Project, in cooperation with the Coahoma County Soil and Water Conservation District and the Soil Conservation Service, may solve the drainage problem.

According to Shanks, the project, cost shared by the town of Jonestown and the Soil Conser-

Alderman James Shanks (right) shows Hiram Boone, SCS soil conservationist, part of the Jonestown area that has a critical drainage problem.



vation Service, will provide outlets for surface drainage in the town.

An employee of Delta Construction Co., which is helping to install the sewer system said, "It is a miracle these people didn't die years ago of typhoid fever from the conditions in which they live."

Shanks said that last year a little girl in the Head Start program contracted hepatitis after playing on the slime-covered ground. Shanks continued, saying that in summer mosquitoes make living conditions in the area almost unbearable. Even though the city sprays the area, there is a great problem. He said that because the children don't take proper care of mosquito bites, the welts often get infected.

Shanks and others have tried to have the drainage problem corrected, but they always got the "run around," as Shanks put it. Correcting the problem is a city problem, and the city doesn't have the money. Some of the lots are privately owned, but the owners don't have money either.

Hiram Boone, of the local Soil Conservation Service office, said that because cities and towns in Coahoma County have become part of the conservation district, SCS can furnish urban dwellers technical assistance in drainage, conservation, beautification, and other environmental improvement measures.

When the sewage system is complete, all residences in the area must be connected to the sewer line. This will eliminate all outdoor privies in the area, making living condition more sanitary.

And it will be several months before the surface drainage project gets underway, but people who have lived in the swampy area for as long as 10 years probably won't mind waiting a few more months. ♦



Alderman Shanks talks with some of the children living in an area where stagnant water surrounds more than 100 houses almost the year round. A surface drainage project that will remove the excess water is being planned for the area.

Reprinted by special permission from *The Clarksdale Press Register*, Clarksdale, Mississippi.

A winner picks a winner

by Fred Trump
Information specialist, SCS
Salina, Kansas



Eric Haberer, his wife Marlene, and two sons and a daughter live in a century-old limestone house on their ranch in northwest Russell County, Kansas. The two children shown here are curious about the Halloween preparations.

"Outstanding — a real complete program," said Eric Haberer about the Great Plains Conservation Program.

That's a case of a winner picking a winner, for in 1972 Haberer, a Russell County farmer-rancher, was named the "outstanding young farmer" in Kansas by the Jaycees. The honor was bestowed on him for his farm management, conservation work, and community involvement.

"The biggest advantage of the Great Plains Conservation Program is its completeness," Haberer claimed. "It's carried out over a period of years, one thing one year, something else another year. You have a schedule as to how you are going to execute all the different phases of your conservation program. You are assured of the cost sharing every year and are guaranteed that the funds are there to complete the program."

This alert young man, a business administration graduate of Kansas Wesleyan University in Salina, has been farming for 9 years. He manages 530 acres of cropland and 1,470 acres of native grass rangeland.

Haberer lives on and operates the rented farm where he was raised. His scenic spread is located where a small saline stream breaks from the uplands into the broad Saline River Valley. Appropriately, a nearby community is named Paradise.

This is the unique limestone post country, where farmers at the turn of the century quarried limestone for fence posts.

"The owners of the farm have always been most cooperative on conservation ventures. Every acre of this land that needed it has been terraced for about 8 years," Haberer pointed out.

The Great Plains program part of his operations has been carried out on land that he and his wife bought 4 years ago.

"The most important work has been establishing terraces and waterways on my cropland," he said. "Already, in 2 years of farming with the terraces and grassed waterways I can see a big difference in the consistency of the soil.

"Along with the conservation practices on cropland, I've constructed a stockwater pit on rangeland that is supplied by spring water. I've also established mixed native grasses on 12 acres of former cropland that was marginal. The land that was seeded back to grass has to be fenced, and the Great Plains program helps with that.

"Overall, the work carried out under my Great Plains program contract is going to be a great economic help to me."

Haberer's livestock program consists of 110 Hereford cows. He sells 1½-year-old calves in the fall.

His crops include sorghum for livestock feed and wheat as a cash crop.

"I'm a great believer in stub-

ble mulching," said Haberer. "It has helped a lot in building up the humus content of the soil. It's one of the best ways I know of conserving moisture in the soil. The stubble on the surface protects the soil from the wind and rain. By keeping the residue as close to the surface as possible, the soil is going to be easier to till and it holds moisture better.

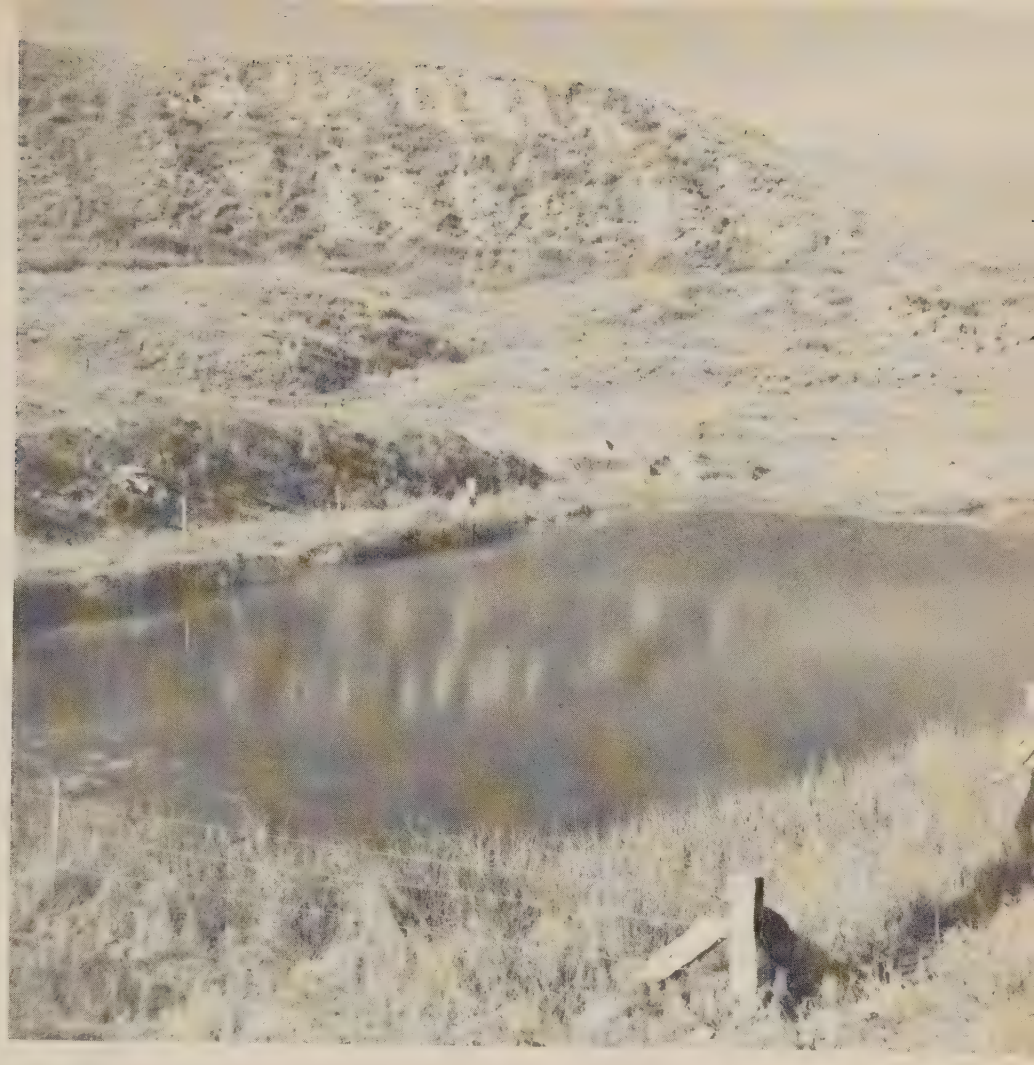
"It's very important to conserve all the moisture possible. Yearly precipitation here is only about 23 inches. We do strictly dryland farming in this area, except for a small acreage in irrigated crops next to the river. I apply water before spring planting, rather than in the summer when the river is low and the salt content high.

"In 2 years with terraces, I have been able to reduce water runoff. This, with stubble mulching, has made a big difference.

"Keeping the soil from washing into rivers and eventually into the Gulf of Mexico is going to be a major factor in pollution control. Everyone can benefit from conservation work in the uplands.

"Erosion control also brings a better environment to our game birds, deer, and other animals. And local merchants are helped by our being able to raise better crops.

"A young farmer neighbor recently asked me about the Great Plains Conservation Program. I recommended it to him, of course." ♦



A stockwater pit built under the Great Plains Conservation Program provides needed water on native grass range for Haberer's cattle. The corner posts are native limestone quarried at the turn of the century.



Haberer has his cropland terraced, and the terraces empty into grassed waterways. Most of the rain that falls stays on the land.

The sweep of sage or a sea of grass

by Dan S. Budd
President, Wyoming Association of
Soil and Water Conservation Districts
Big Piney, Wyoming

If I had my way, we in Wyoming would start at once to get a good grass back on the slopes where now you see mainly sagebrush.

I admit that the sweep of sage has a definite beauty. But to me, grass belongs there in a more realistic proportion.

People are inclined to believe that the sagebrush on our hills was always there. Originally the grass was there, and that's the way it should be again.

People seem to forget that with a heavy cover of sagebrush our soil resource is slipping away. Sagebrush can't hold the soil. The soil runs off into our streams and lakes. Some of us realize too late the value of our watershed as an essential part of our environment and our lives.

Much of the public land so important to us in livestock production is producing far less than its potential. But I have seen such land brought back to strong, healthy grass cover. To do that you have to control the sage and rest the land from grazing until the grass is reestablished. You have to seed grass in places. And you manage grazing so that the grass remains vigorous while supporting the cow and wildlife population of which it is capable.

There are millions of acres in Wyoming and other states in the West with such a heavy infestation of brush that worthwhile grasses cannot grow. The sagebrush in our area was not always so thick. When my grandfather ranched on these slopes, sagebrush shared the land with good grass.

The vast Wyoming acreages now in sagebrush, including public lands, can be brought under conservation management with a minimum of cost. The returns will far outweigh the outlay. My family has proved this on our own land.

In a few years, I believe our ranch will be able to support 1,000 mother cows—that's one-third more than we now have.

And how many more elk, deer, and antelope? And sage grouse? Easily twice as many and probably a lot more.

The Budd family came to this country west of Big Piney in southwest Wyoming five generations ago. The original ranch was less than 1,000 acres. My father started our present ranching enterprise in the 1950's. It now covers 8,900 acres. Some of it is irrigated and in hay; most, though, is in steeply sloping range or high mesas.

In summer we put our cattle on 4,900 acres administered by the Bureau of Land Management and on 6,300 acres of national forestland. This privilege is important to us. It lets our grass recover in the growing season.

In the 1950's we began work on our conservation ranch plan. What we have accomplished through conservation work is equal to doubling the size of our ranch.

We controlled brush. We built cross fences for better grazing management. We made sure there was water where it was needed to get good grazing distribution and where the stock could get to it. On our irrigated land, we used modern methods to make the most use of the water available to us. We keep a good supply of hay in reserve.

The results have been better than we expected. Land that carried 350 head of cattle when we started now supports 650 mother cows, and this is improving all the time.

To the people who contend that our control of brush is bad for wildlife, I have this to say. The elk that my grandfather used to see here, but which were missing for years, are back. Deer and antelope seem to prefer these pastures to the areas where there may be more cover but less palatable food. And sage grouse are present in great numbers.

Ranching in this country is never easy. Sometimes in winter this is the coldest place in the nation. At best, our growing season is 65 days long. Then, like others, we sometimes have the problem of depressed prices along with higher costs, so we don't show a profit every year.

Still, this is home to us, and we would be reluctant to live anywhere else ♦.





(Above) Dan S. Budd, left, and Dom Feeley, SCS area conservationist, observe the effect of sagebrush control on a Budd pasture. Budd says his treatment program leaves ample sage for wildlife food and cover. (Left) Dan Budd has a seasoned helper in 15-year-old Karen. She and her sisters, Janet and Martha, represent the fifth generation of Budds in Wyoming ranching.

Recon . . .

Tree-mendous success. One of the objectives of Pennsylvania's Monroe Conservation District is to encourage tree planting, so district directors decided to have a seedling sale. Not knowing what the public response might be, the district ordered 10,000 seedlings. Boy Scouts agreed to sell and distribute. Announcements and news releases went out, and orders started to come in. By the time sale-day arrived, it was necessary to order 5,000 more trees to satisfy actual and anticipated sales. Sales were so overwhelming that the district extended the sale period and accepted orders for an additional 17,000 seedlings.

Erosion—money down the drain. According to a survey made by the University of Missouri, loss of valuable topsoil means money down the drain. Height of young plants, survival rate of the crop, and yield are all adversely affected by erosion. Production costs can increase up to 56 percent in severely eroded areas. The Missouri scientists found that a slightly eroded field netted farmers slightly less than an uneroded field; moderate erosion dragged net income down $18.32 an acre; and severe erosion cut into farmers' pocketbooks at the rate of $33.20 per acre.

Junked—every year: 48 billion cans, 30 million tons of paper, 4 million tons of plastic, 26 million bottles and jars, 7 million autos and trucks, and nearly 8 million television sets.

Mt. Trashmore, farewell. Officials in Virginia Beach, Virginia, are thinking of saying goodbye to Mt. Trashmore, the sanitary landfill that was to be a recreation site. Sanitary landfills are better than open dumps, but if Virginia Beach continues to heap its trash and throw soil on top of it, officials fear the city will become the first mountainous municipality on the Atlantic Coast. Now they have a new plan. Before burying its trash, Virginia Beach hopes to process it. Iron and steel will be collected by magnet and sold to junk dealers; aluminum and copper will be sorted out, steam cleaned, and compacted for recycling; and glass also will be removed and marketed. What's left after that will be put in a 2,000-degree "oven" that will produce steam for use as energy in nearby buildings. This incinerator will be low-polluting.

Acres for wildlife. The South Dakota Department of Game, Fish, and Parks has adopted an Acres for Wildlife program similar to the one established in Nebraska. Under the program, landowners enroll parcels of land and agree not to burn, graze, mow, or apply harmful chemicals to that land. Any rural area 1 acre or more in size can be enrolled. Already 1,420 landowners have enrolled 62,181 acres, including a whopping 32,000 acres of railroad right-of-way enrolled by the Milwaukee Road. Seven states now have an Acres for Wildlife program. The others, besides Nebraska, are Kansas, Minnesota, North Dakota, Oklahoma, and Wyoming.

A hole lot of uses. Seems a shame to let good holes in the ground go to waste, or so it seemed in Kent County, Maryland, after 4 carefully selected pits had been excavated and used for the 13th National Collegiate Soil Judging Contest. The University of Maryland, which hosted the contest, opened up the holes to the public. A UM soil classification class made use of the pits and was followed by a soils seminar for farmers, realtors, and contractors, sponsored by the university, SCS, the Kent Corn Improvement Association, and the Kent Soil Conservation District.

State and county sanitarians were next, studying the pits in line with their interest in soil as a medium for waste disposal. A high school vocational agriculture class stepped in after the sanitarians; then the Kent County High School land judging team used the pits for training; and finally the Eastern Shore High School Land Judging Contest was held at the well-used pits.

Somewhere in this crush of people, Dr. Roy Simonson, assistant to the SCS Deputy Administrator for Soil Survey, photographed the sites to add to his collection of "soils of the world." Not bad for just some holes in the ground.

KEEP OFF THE GRASS—and they mean it in Pennsylvania. A 1939 law—Public Law 872 (Act 375), Section 932—in the Keystone State governs the protection of trees and plants and makes the willful walking on grass a misdemeanor with a fine of $300 or a 6-month prison sentence, or both, upon conviction.

Youngest district chairman??? Centre Conservation District directors believe they have the youngest district chairman of any conservation district in Pennsylvania and even in the United States. After 12 years as chairman, John Stover turned over the gavel earlier this year to Carl Homan. Homan, who is 23, has been a director for 2 years.

Review

Soil surveys

Michigan

Ottawa County. By Karl E. Pregitzer. *1972. Soil Conservation Service in cooperation with Michigan Agricultural Experiment Station. 139 pp., illus.; maps.*

Minnesota

Swift County. By Raymond T. Diedrick, John C. Harries, Paul L. Larson, Ernest L. Miller, Aldean G. Rhyner, James J. Murray, and Charles K. Sutton. *1973. Soil Conservation Service in cooperation with University of Minnesota Agricultural Experiment Station. 116 pp., illus.; maps.*

Mississippi

Lee County. By Miles C. Garber. *1973. Soil Conservation Service in cooperation with Mississippi Agricultural Experiment Station. 72 pp., illus.; maps.*

New Hampshire

Strafford County. By Frank J. Vieira and Richard W. Bond. *1973. Soil Conservation Service in cooperation with New Hampshire Agricultural Experiment Station. 96 pp., illus.; maps.*

New York

Monroe County. By Robert L. Heffner and Seymour D. Goodman. *1973. Soil Conservation Service in cooperation with Cornell University Agricultural Experiment Station. 172 pp., illus.; maps.*

North Carolina

Alleghany County. By Edward O. Brewer, Robert M. Brown, and Julian H. McIntyre. *1973. Soil Conservation Service in cooperation with North Carolina Agricultural Experiment Station. 56 pp., illus.; maps.*

North Dakota

Walsh County. By Robert L. Hetzler, Robert H. Dahl, Kenneth W. Thompson, Kermit E. Larson, Bertram C. Baker, and Carl J. Erickson. *1972. Soil Conservation Service in cooperation with North Dakota Agricultural Experiment Station. 126 pp., illus.; maps.*

Ohio

Warren County. By Dale E. Garner, Neil E. Reeder, James E. Ernst, and Norbert K. Lerch. *1973. Soil*

Meetings

October

16–19 National Future Farmers of America, Kansas City, Mo.
21–24 American Chamber of Commerce Executives, Cincinnati, Ohio
21–25 American Institute of Planners, Atlanta, Ga.
21–25 Association of Official Seed Certifying Agencies, Detroit, Mich.
21–26 American Water Resources Conference, Seattle, Wash.
22–24 Urban Land Institute, Lake Tahoe, Nev.
22–25 Second International Pollution Engineering Congress and Exposition, Philadelphia, Pa.
22–26 Association of Engineering Geologists, Los Angeles, Calif.
28–30 Southeastern Agricultural Chemicals Association, Pine Mountain, Ga.
28–Nov. 1 Adult Education Association of the USA, Dallas, Texas
29–31 American Plywood Association, Atlanta, Ga.
29–Nov. 2 American Society of Civil Engineers, New York, N.Y.

November

1–3 National Council for Geographic Education, Washington, D.C.
7–8 Twelfth Annual Purdue Air Quality Conference, Indianapolis, Ind.
11–14 National Association of State Universities and Land Grant Colleges, Denver, Colo.
11–15 American Institute of Chemical Engineers, Philadelphia, Pa.
11–16 American Society of Agronomy, Crop Science Society, Soil Science Society of America—Joint Annual Meeting, Las Vegas, Nev.
12–14 Geological Society of America, Dallas, Texas
12–16 National Water Resources Association, Phoenix, Ariz.
12–16 American Association of State Highway Officials, Los Angeles, Calif.
12–20 National Grange, 107th Annual Session, Lincoln, Nebr.

December

2–5 National Conference on Access to Recreational Waters, Fort Lauderdale, Fla.
2–6 National League of Cities, San Juan, Puerto Rico
2–8 National Association of Manufacturers, New York, N.Y.
5–7 Western Forestry and Conservation Association, San Jose, Calif.
11–14 American Society of Agricultural Engineers, Chicago, Ill.
12–14 Geological Society of America, Dallas, Texas

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D. C. 20401

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300
AGR 101

POSTAGE AND FEES PAID
U. S. GOVERNMENT PRINTING OFFICE

MOVING? Send present mailing label and new address, including zip code, to Division of Public Documents, U.S. Government Printing Office, Washington, D.C. 20401.

Conservation Service in cooperation with Ohio Department of Natural Resources and the Ohio Agricultural Research and Development Center. 115 pp., illus.; maps.

Oklahoma

Caddo County. By Hamilton H. Moffatt. *1973. Soil Conservation Service in cooperation with Oklahoma Agricultural Experiment Station. 70 pp., illus.; maps.*

Craig County. By Claude T. Newland. 1973. *Soil Conservation Service in cooperation with Oklahoma Agricultural Experiment Station. 65 pp., illus.; maps.*

Jefferson County. By Hubert L. Mobley and William J. Ringwald. *1973. Soil Conservation Service in cooperation with Oklahoma Agricultural Experiment Station. 65 pp., illus.; maps.*

Pontotoc County. By Vinson A. Bogard. *1973. Soil Conservation Service in cooperation with Oklahoma Agricultural Experiment Station. 69 pp., illus.; maps.*

Oregon

South Umpqua Area. By Ellsworth M. Richlen. *1973. Soil Conservation Service in cooperation with Oregon Agricultural Experiment Station. 60 pp., illus.; maps.*

Pennsylvania

Fayette County. By Frank A. Kopas. *1973. Soil Conservation Service in cooperation with the Pennsylvania State University Agricultural Experiment Station and Agricultural Extension Service; and the Pennsylvania Department of Agriculture, State Soil and Water Conservation Commission. 108 pp., illus.; maps.*

South Carolina

Lancaster County. By Vergil A. Rogers. *1973. Soil Conservation Service in cooperation with South Carolina Agricultural Experiment Station. 129 pp., illus.; maps.*

Tennessee

Obion County. By William T. Brown, Wesley C. Jackson, Glisson L. Keathley, and Charles L. Moore. *1973. Soil Conservation Service in cooperation with Tennessee Agricultural Experiment Station. 58 pp., illus.; maps.*

Texas

Erath County. By Billy J. Wagner, Jesse R. Thomas, Edward R. Harris, Ernesto Deleon, Cecil G. Ford, and J. David Kelley. *1973. Soil Conservation Service in cooperation with Texas Agricultural Experiment Station. 82 pp., illus.; maps.*

Washington

Clark County. By Dale A. McGee. *1972. Soil Conservation Service in cooperation with Washington Agricultural Experiment Station. 113 pp., illus.; maps.*

West Virginia

Jefferson County. By William F. Hatfield and John W. Warner. *1973. Soil Conservation Service in cooperation with West Virginia Agricultural Experiment Station. 81 pp., illus.; maps.*

1.6
So35

SOIL conservation

U. S. Department of Agriculture/Soil Conservation Service/November 1973

39/4



U.S. DEPT. OF AGRICULTURE
NAT'L AGRIC. LIBRARY
MAY 1 '74
DOCUMENT SECTION

Produce and protect

The expected large increase in agricultural production in the United States presents major responsibilities and fresh opportunities for the Soil Conservation Service and conservation districts.

The responsibility is to encourage land users to get additional cropland under a conservation plan promptly and to select for intensive farming those acreages that can be protected adequately from soil erosion. Closely related is the job of helping landowners find ways to increase farm and ranch income and production.

Secretary of Agriculture Earl Butz said recently, "While there is plenty of additional land in the United States that can be used for crop production without endangering our basic soil and water resources, there are also millions of acres of farm and ranch land with soils so prone to blowing or susceptible to water erosion that they should never be used for crops."

Also recently, the National Association of Conservation Districts called for a nationwide campaign to make sure farmers and ranchers use conservation practices to prevent accelerated wind and water erosion—to avoid another Dust Bowl.

We must work with farmers and ranchers to remind them that soil erosion control, or the lack of it, directly influences crop yields and farm income. One recent study, reported by the Agricultural Engineering Department of the University of Missouri, showed that soil erosion in some areas seriously reduced the production of corn and soybeans and resulted in a net income drop of $18.32 an acre on moderately eroded fields and $33.20 an acre on severely eroded fields. Production costs for these farmers rose 20 percent on moderately eroded fields and 56 percent on severely eroded fields, due primarily to the increased time and cost required to prepare the seedbed.

Conservation can increase net income . . . increase yields and crop quality . . . reduce production costs. This is nothing new to long-time farmers, but it may be to some of the other people we serve. The time for examples and testimonials is now. The time for letting people know what assistance we can offer them is now.

The strong demand for food products offers the American farmer and rancher an excellent opportunity to bring about real efficiency in his operations and to install good conservation systems.

For example, a bottomland farmer may now find it profitable to install tile drainage or to make other improvements in his water management system. He will gain in crop yields, be able to work his fields better, and reduce wet spots.

An upland farmer may be able to put in a new terrace system and thus add new acres of tillable land. An irrigation farmer may be able to afford ditch lining and save on his water use. Another farmer or rancher may have added incentive to bring his pasture and rangeland into first-class condition.

At a time when American farmers are producing more than ever, they should be enabled to install the necessary protective measures. The Soil Conservation Service must continue to help farmers and ranchers with efforts to retain the quality and productive capacity of their land for both the next year *and* the next generation.

Kenneth E. Grant

SOIL conservation

November 1973, Vol. 39, No. 4

Contents

2 From the Administrator

4 Cattle and catfish on surface-mined land
by Kent Alverson

7 Conservation tillage jumps in Iowa
by Wilson T. Moon

8 Soil interpretations for environmental forestry
by Vincent J. Price

11 Conservation in action at Boy Scout Jamboree
by Duane A. Bosworth and Byron A. Breisch, Jr.

15 Water on every pasture
by Jerry D. Schwien

18 Conservation in action

22 Review

22 Meetings

23 Recon

COVER: Harvesting wheat in the rolling hills along the Columbia River in Oregon. These wheat areas are among the most productive in the world, but soil and water problems challenge farmers to protect while producing.

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

EARL L. BUTZ, Secretary of Agriculture.

KENNETH E. GRANT, Administrator, Soil Conservation Service

PHILLIP A. CHAVEZ, Editor

MARYELLEN BERTRAM, Editorial Assistant

SOIL CONSERVATION, the official magazine of the Soil Conservation Service, is published monthly by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. Use of funds for printing this publication approved by the Director of the Office of Management and Budget, July 17, 1973.

Reprint permission: Contents of this magazine may be reprinted without permission. Credit is not required but is appreciated. Photographs are available on request.

Commercial names: Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscription: $3.50 per year, $4.50 foreign. Single copy, 45 cents. Discount of 25 percent on orders of 100 or more sent to same address. Order direct from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Cattle and catfish on surface-mined land

by Kent Alverson
Public information officer, SCS
Lincoln, Nebraska

In Victoria, Illinois, cattle and catfish have helped prove that surface-mined land can be made productive again.

John W. Curry has 400 acres of such land on his 2,090-acre farm. Curry has one of the most unusually diversified farming operations in Illinois. He farrows and finishes 5,000 pigs a year, rides herd on 200 crossbred beef cows, and produces 200,000 commercial catfish annually. He employs four men full time.

It's the surface-mined land that gives Curry his biggest challenge and also the most adventure. As Curry sees it, there is no point in wishing the surface mining hadn't happened. The scars on the land can't economically be erased. But if a landowner is willing to adjust his thinking to accept the land's limitations, he can find a lot of opportunities.

In Knox County, surface-mined land has many water pockets that have a tight seal and remain full even though there is very little runoff from surrounding land. Somehow the pockets, or ponds, maintain their water quality. In 1968, Curry started his catfish enterprise by stocking 40 acres of these small ponds, most of which are less than an acre in size. Today he distributes more than 200,000 fingerlings to other pond owners and annually produces 50,000 pounds of dressed fish. He gets 10 cents each for his 4-inch fingerlings and just over $1 a pound at current wholesale prices for the dressed product.

Curry gives credit to Dr. Milton Bowman, professor of botany at Monmouth College, and to Ralph Wells & Co., makers of pet and fish food, for his being one of the pioneers in successful production of catfish in surface-mine ponds and for getting him started in the fish business.

"I followed Dr. Bowman around for 4 years while he was doing basic research on catfish, surface-mine water quality, food

It's hard to miss this sign when you drive past John Curry's fish hatchery.





Once of little value, lakes like this on surface-mined land are now used for catfish production.

requirements, and reproduction problems. We made lots of mistakes and had few successes," he recalled. "Later we teamed up with Ralph Wells & Co. to form a corporation called GWEBCO (from Gibbs, Wells, Bowman, and Curry). The partnership has since been dissolved, and I own the business and the name now."

According to Curry, "We brought in river catfish as a starter but couldn't get the female catfish to drop their eggs in captivity. Through the use of hormones we managed to overcome that problem. Then, when we got into production, we had to start a selling campaign to dispose of the catfish.

"Doctor Bowman is a gourmet cook. He talked to restaurant owners and showed them how to cook catfish. In this way we built up a market."

Curry, however, finds it easier and more profitable to sell fingerlings. "There are hundreds of sportsmen's clubs, large and small, with ponds and lakes to be stocked," he explained. "Besides, many pond owners turn to catfish when the standard bass-bluegill stocking formula fails to provide good fishing.

"Our best business is selling 8- to 10-inch fingerlings," said Curry. "Catfish must be that large to escape being eaten by bass that may still be in private ponds. Also, club owners with lakes and ponds want instant fishing for their members. I could sell tons and tons of the larger fingerlings to these clubs if I had them."

Another reason for shifting away from food production was the staffing problem. Few people have the talent, experience, and education for such a broad operation. In that business, a person needs economic sense and an ability to meet the public. Curry found he had to tend to too many details himself. His future plans therefore call for development of more recreation areas for fee fishing.

"With proper management and controls, we can put fish out and use fishing as a method of harvesting rather than the pump-down and seining approach used now," Curry explained. "Almost anybody I could hire can go out and feed the fish regularly in 40 ponds. By rotating the lakes we use and building up the reputation of individual lakes, we can keep up the excitement for the fishermen. One bit of strategy is to throw a little fish food into the water. The ensuing commotion shows the fish are there, and that's all it takes."

Water quality is maintained through fertilization, weed control, population control, and the rate of feeding.

The following are steps in fish production: (1) spawning, which occurs in the surface-mine ponds; (2) collecting the small fish (blue, channel, and albino catfish) and developing them into 2-inch fingerlings in tanks in a metal building; (3) feeding the fingerlings to the desired marketable size (4 to 12 inches); (4) harvesting, grading, and sizing; and (5) selling and distributing and public relations.

Does fish farming fit in well with other farming operations? Not too well, asserted Curry. It competes for time with most of the other work. Wet weather that stymies cropping chores also makes it hard to work with the fish. So it is really an additional farm business to be judged on a cost-return basis. It takes roughly 1½ pounds of feed to produce a pound of fish. Labor and equipment costs, too, can be accurately measured.

Curry's pasturelands for his Charolais-Hereford-Angus cross-bred cow herd are surface-mine spoil banks that have been partially leveled and reseeded. The soils there are calcareous rather



John Curry "splash feeds" his catfish.

than acid, like those in many mined areas, so it is easy to grow alfalfa along with grass. Calves do well and leave their mothers with a 205-day adjusted weaning weight of 500 pounds. Most are sold to neighboring feeders.

Keeping track of cattle in the irregular, scattered surface-mine pasture areas is sometimes difficult, as is managing feed and water. But Curry is not one to take the easy way. And his attention to detail pays him good money.

He likes to purchase land in a low state of productivity and find ways of improving it. Starting with a soil survey map and other data provided by the Soil Conservation Service staff at Galesburg, he develops a suitable program. Curry is a cooperator with the Knox County Soil Conservation District and is recognized as a conservation farmer. He calls Len Gulson, SCS district conservationist, "a good friend and helpful adviser."

Curry sees other possibilities for use of surface-mined lands, particularly with the current demand for more kinds of outdoor recreation. Camping and bicycling have been cited as examples of good use. Curry plans to introduce swans, wild geese, and ducks to mine-spoil areas, hopefully for commercial gain.

From 1964 to 1968, Curry was a member of the U.S. Department of Agriculture's advisory committee on feed grain, wheat, and soybeans. He is vice president of the National Corn Growers Association and a former director of the Illinois Grain Corporation. He is also treasurer of Spoon River Farm Supply, Inc., and has repeatedly held offices in the Knox County Farm Bureau. He was recently honored by *Prairie Farmer* magazine with the Master Farmer award. ♦

Conservation tillage jumps in Iowa

by Wilson T. Moon
State conservationist, SCS
Des Moines, Iowa

Increased crop production and land protection went hand in hand with energy conservation on 5½ million acres of Iowa's corn and soybean land this year. It was all possible because, in place of the moldboard plow, conservation tillage, also known as minimum tillage, was used to prepare seedbeds.

The 5½ million acres planted by conservation tillage methods in 1973 is nearly a 90 percent increase over last year's 2.8 million acres. With an estimated 18.8 million acres of corn and soybeans in the state, it also means that more than one-fourth of Iowa's cropland was planted using some type of conservation tillage.

According to a survey by the Soil Conservation Service, about three-fourths of Iowa's conservation-tilled land was planted after discing or after use of a field cultivator or similar machine. This leaves some residue on the soil surface, providing for better erosion control.

The most popular of the special conservation tillage methods, according to the survey, was the chisel plow. It was used on more than a million acres. Others, in order of popularity, were till planting, 265,184 acres; rotary strip tillage, 147,510 acres; and no-till planting, 110,414 acres.

Only 5 years ago, there was virtually no conservation tillage in Iowa. Acceptance of the practice comes at a critical time, for it gives Iowa farmers and the rest of the nation's food producers an opportunity to produce on their land and protect it at the same time.

Iowa farmers say that conservation tillage helps them in at least three ways: (1) leaving crop residues on the soil surface helps stop wind and water erosion, (2) fewer trips made across a field mean saving fuel and energy, and (3) the fewer trips across a field give the farmer more time for other work.

With current concerns about fuel and food shortages, "produce and protect" is a great idea. ♦



A chisel planter planting in old corn residue—more than one-fourth of Iowa's cropland was planted using some type of conservation tillage in 1973.



A row planter on a Corning, Iowa, farm—the field was not plowed prior to planting.

Soil interpretations for environmental forestry

by Vincent J. Price
Information Division, SCS
Washington, D.C.

Dear Sir:

I recently bought a parcel of land that includes an old farm pond. I'd like to plant some trees around the pond for shade and beauty. Where can I get information on the kind of trees that will grow best on my land?

The Soil Conservation Service receives many such letters concerning environmental forestry—the management of trees and woodland for esthetic, wildlife, and recreational values.

Public interest in environmental forestry is growing rapidly. Farmers want trees for windbreaks and wildlife habitat. Cities and towns plant trees along streets, in parks, and in open areas. Homeowners like ornamental trees around their houses. Developers of industrial sites and subdivisions recognize the importance of trees in landscaping, and more and more people are buying small parcels of forest land for personal pleasure.

The capabilities and limitations of their soil will make a difference to all of these people. Will the soils at a subdivision site limit the developer in his use of trees for landscaping? What should a farmer plant for his windbreak? Can a certain type of tree grow well along a steep streambank?

Soil Conservation Service specialists point out that soil interpretations for environmental forestry often provide the answer.

A tree's environment

Trees, like people, are adaptable. Many of them, given half a chance, will grow under a variety of conditions. But most trees are

Imagine what this housing development in Lake County, Illinois, would look like without ornamental trees and shrubs.





Shelterbelt plantings in the Palouse of Washington provide habitat for pheasant.

best suited to a specific type of soil, weather, and topography.

Soil drainage is perhaps the most important single factor in determining which trees to plant in an area. Some trees, such as bald cypress, grow best in very wet spots. Other trees, such as white oak, are almost always found on well-drained soils.

Soil texture affects the general water-holding capacity of a soil and helps determine how well trees will grow. In northern Michigan, the red pine does best on sand soils, the white pine on loamy sand soils, and on sandy loam or other finer textured soils deciduous trees, rather than pines, will be the species found.

Depth to bedrock limits the type of tree that can be planted successfully. Trees with deep rooting systems will do poorly in soils that are shallow to bedrock. When trees are unable to root down properly, there is the increased danger of their being "thrown" by a heavy wind.

Soil chemistry, as gardeners know, also affects tree growth. Northern white cedars prefer alkaline soils, while dogwoods grow best in acid soils.

The relationship between trees and soil is a flexible one. For example, landowners in northern Michigan can plant red pine in fine-textured soils, and the trees may grow well if the landowners protect them from competition. Similarly, if a landowner plants dogwood on highly alkaline soil, or redbud on highly acid soil, generous applications of sulfur or lime can make the soils more suitable for those types of trees.

But in most cases, land users would do well to plan trees and woodland with a close eye on the soil. By picking the tree species that are naturally adapted to his soils, the land user puts himself in the happy condition of working with nature. He'll likely get faster tree growth, a better survival rate, and healthier trees.

Trees and soil surveys

For decades, soil scientists have been mapping soils in all parts of the country and have interpreted the soil data for farmers, engineers, home builders, planners, and local government



Washington hawthorne trees, in the background, and azaleas add to the beauty of Dulles International Airport, near Washington, D.C.

officials. In the past few years, interpretations for environmental forestry have been included in some soil surveys. To make these interpretations, SCS soil scientist-forester teams study the occurrence and growth rate of tree species on specific kinds of soil. They measure the height and diameter of the trees and determine their age. They classify the soil and describe its important properties. This procedure matches kinds of soil with suitable tree species. Nearly 1,000 areas are studied each year.

"These soil-woodland site studies provide a tremendous amount of basic data," said Dr. Donald E. McCormack, assistant to the director of SCS's Soil Survey Interpretation Division. "We've learned a good deal about the unique relationships between soil properties and tree growth, and we've quantified these relationships."

The original impetus of the program was better management of commercial tree species such as maple, Douglas fir, or pine. But site study teams also note the understory vegetation, and this information is readily transferable to environmental forestry uses.

Trees for people

Lake County, Illinois, a metropolitan county north of Chicago, was once a forest of oak, maple, hickory, and tamarack. Few areas of woodland remain today, and commercial forestry is of little importance to this area. But environmental forestry—trees for people—is important, and this is reflected in the recently completed "Soil Survey of Lake County."

The survey places Lake County soils in six tree-planting groups, and suggests forest, ornamental, and windbreak plantings for each group. For example, recommended forest plantings for somewhat poorly drained silt loam soils that have slow permeability are sycamore, green ash, red maple, and silver maple. Recommended medium ornamentals (30 to 60 feet high at maturity) for the same soils are willow, birch, moraine locust, northern white cedar, and aspen. Recommended small ornamentals are American arborvitae, European alder, eastern redcedar, and crabapple.

The county's soils are also placed into shrub- and vine-planting groups. Species are recommended for each group, and characteristics of each species are given, such as height, form, and tolerance to sun and shade. Other data—that the plant bears fruit, provides wildlife food, must be grown from cuttings, is slow growing, best uses for shrubs—can be very helpful to homeowners.

"This information is used quite frequently by individual homeowners," reported Lee Bridgman, the SCS area conservationist at Edwardsville. "We've got a lot of suburban estates, 2 to 10 acres in size, in the county. And many of the landowners make use of the soil survey in planting trees and shrubs.

"The soil interpretations are also used by village officials and in park and school districts. The Lake County Forest Reserve uses them in determining where and what to plant on its large holdings. The nearby Cook County Forest Reserve also uses Lake County interpretations because the Cook County soil survey has not been completed."

According to Earl Voss, SCS state soil scientist for Illinois, "Similar interpretations are available or are planned for most of the Chicago metropolitan area, including Kendall, DeKalb, Cook, DuPage, and Kane Counties and the predominantly rural Kankakee and Grundy Counties."

Soil interpretations for environmental forestry are not included in all published soil surveys. There are plans, however, to make these interpretations available to anyone who needs the information and can secure a soils map. Then homeowners, builders, park commissioners, and county planners around the nation can have ready access to more of the information they need to successfully plant and grow trees for people. ♦

Conservation in action at Boy Scout Jamboree

by Duane A. Bosworth
Information specialist, SCS
Portland, Oregon
and Byron A. Breisch, Jr.
District conservationist, SCS
Butler, Pennsylvania

At about 8 o'clock each morning, a goshawk suddenly dropped from the sky, flew slowly over a little marsh and the adjoining field, wheeled in a tight circle to avoid the tall lodgepole pines along the edges of the small open area, and took a close look around for squirrels, chipmunks, and edible birds.

His daily rounds had to be made early because within the hour the site would be swarming with hundreds of Boy Scouts, Scout leaders, and visitors.

Here at the little marsh, which was built by the Soil Conservation Service, in the environmental conservation education area at Boy Scout Jamboree West, Scouts learned the meaning of interdependence among different forms of life in an ecosystem. The water environment of the marsh provided a habitat that attracted a variety of insects, birds, and small mammals. As the predator at the top of the food pyramid, the goshawk must have been amazed at the deluxe accommodations provided for him.

Across the continent at Boy Scout Jamboree East, other Scouts participated in similar conservation learning experiences that SCS had a major role in arranging. Against a backdrop of second-growth hickory and oak, the Scouts began their activities by studying a colorful mural that depicted changes in the landscape over the last 15,000 years and changes in use of the land on which Jamboree East was being held.

The scene portrayed by the mural started with the retreat of the most recent glacier, which changed the direction of flow of streams, altered the landscape, and helped to form the soil on which the forest now grows. Then the scene shifted to use of the land by Indians and moved on to show early white settlers at work clearing the original forests for farmland.

Coal mining, oil production, and recreation use of the land today completed the sequence of land use changes depicted on the mural.

The 1973 Scout Jamboree was held simultaneously at two locations during the last week of July and the first week of August. The site for Jamboree East was Moraine State Park, about 40 miles north of Pittsburgh, Pennsylvania. The park, 15,000 acres of land that until recently had been extensively surface mined, gave Scouts many opportunities to see the results of reclamation and conservation work. Lake Arthur, a newly created, many-fingered 3,200-acre body of water within the park made it possible for Scouts to enjoy water related activities.

Jamboree West was held at Farragut State Park, a 5,000-acre reserve on the shores of beautiful

Waldo Potter, district conservationist at Provo, Utah, briefs Scouts at the entrance to the SCS "Conservation in Action" trail at Jamboree West.





1



2



5



6





4



7

1. The inviting coolness of an SCS "rap area" stimulated discussions of conservation measures with Marlow Freckleton (center), district conservationist at Coeur d'Alene, Idaho.
2. Good water management in arid western states begins with data on the snowpack in the mountains, and Scouts at Jamboree West were intrigued by snow survey equipment as its use was explained by Jim Englebright, range conservationist at Weiser, Idaho.
3. Scouts learn from Scouts during a demonstration showing how grass and mulch protect soil and help prevent erosion that, in turn, causes sediment pollution of water resources.
4. Ted Pettit (left), manager of conservation services for Boy Scouts of America, stopped at one of the SCS instruction stations at Jamboree West to commend Ralph Fisher, district conservationist at Craigmont, Idaho, on the success of the SCS conservation education areas.
5. Tom Balthasar, district conservationist at New Bloomfield, Pennsylvania, explains splash erosion caused by the force of falling raindrops.
6. Miniature soil profiles assembled in plastic tubes by Scouts as part of their conservation instruction were popular Jamboree souvenirs.
7. A colorful mural by artist Doug Pifer for Jamboree East depicted 15,000 years of changes in land and resources in the Moraine State Park area.



Kenneth Williams (left), director of the SCS Regional Technical Service Center, Portland, Oregon, listens to Jimmie Gleaton, district conservationist at Prosser, Washington, describe the use of different grasses for wildlife food and cover at the edge of the small marsh at Jamboree West.



SCS created model backyards at both Jamboree sites to demonstrate to Scouts the use of trees, shrubs, and flowers in providing food, nesting areas, and shelter for many different kinds of birds. Bill Forrest, district conservationist at McMinnville, Oregon, explains to two Scouts how they can attract birds to their homes.

Lake Pend Orielle in northern Idaho. This park served as the site for the 1969 National Scout Jamboree and for the World Jamboree held in 1967. The National Jamborees are held every 4 years.

More than 75,000 Scouts participated in the 1973 Jamboree, and about as many adults visited the sites to observe Scout activities. The environmental conservation areas, among the most popular program attractions, were developed and manned by about 20 private, state, and federal resource agencies and organizations working with Ted Pettit, manager of conservation services for the Boy Scouts of America.

SCS developed a "Conservation in Action" learning trail for the Scout environmental conservation areas at each of the Jamborees. The trails featured a series of conservation instruction stations, and emphasis was on helping Scouts understand significant soil-water-plant relationships and principles of good land use and conservation. Ideas that Scouts could adapt in carrying out environmental improvement projects in their home communities were built into each demonstration at the instruction stations.

Very popular in the SCS areas at each Jamboree were the soil study stations where Scouts made their own artificial soil profiles from sterilized soil and rock. There the boys also participated in a demonstration of the value of plant cover and mulch in controlling erosion by water. They discovered how water quality is reduced when water moving over the surface erodes bare soil and carries sediment into streams and lakes.

A working model of a sediment control basin at Jamboree East gave Scouts an interesting lesson in the use of conservation measures to improve water quality, and a model of a typical Pennsylvania watershed helped them understand how an urbanizing watershed can be developed without damage to the natural resource base.

A major part of the water resource management and conservation story at Jamboree West was presented in a color mural depicting the snow-survey and water-supply forecasting activities of SCS.

Giving full-time assistance to SCS instructors at Jamboree West was David Alford, from the Idaho State Soil Conservation Commission. The Commission, along with Kaiser Aluminum Co., First Security Bank of Idaho, Boise-Cascade Corp., and J. R. Simplot Co., provided Scouts with copies of conservation materials produced by the Soil Conservation Society of America.

Contributions to the SCS educational program at Jamboree East were made by Butler County Conservation District, Butler County Parks and Recreation Commission, Bureau of Parks and Bureau of Forestry in the Pennsylvania Department of Environmental Resources, Pennsylvania State University, Slippery Rock State College, and local business firms. ♦

Water on every pasture

by Jerry D. Schwien
Public information specialist, SCS
Denver, Colorado

"Stock ponds are as obsolete as a buggy whip," claims John Toedtli, a rancher in Sterling, Colorado. "Cattle drink much more water when it is clean and cool and not all muddy."

Toedtli and his father Bill credit their new system of water tanks and managed grazing with increasing their cattle gains.

"Our yearlings come off the grass at least 40 pounds heavier since we've developed water within easy walking distance and managed our grazing," said John Toedtli.

None of the Toedtlis' 250 Angus-Hereford beef cows and their calves travel more than half a mile for water. The father and son ranchers have split the 14,000-acre ranch into 25 pastures with water tanks located approximately a mile apart.

When they first purchased the ranch one pasture took in 4,500 acres and had only one watering pond. Joe Krebs, of the Soil Conservation Service, said the only time cattle grazed the far end was in the fall when it was cool enough to travel for water. The pasture was overgrazed near the water and undergrazed elsewhere.

With cost sharing under their Great Plains Conservation Program contract, the Toedtlis installed 10 miles of fence dividing the 4,500 acres into 6 pastures. They laid 50,000 feet of pipeline to pump water to each pasture and installed stock tanks for the cattle to drink from. The tanks and fences were needed to carry out the kind of grazing manage-



Dividing a 14,000-acre ranch into 25 pastures and installing water tanks about a mile apart have helped increase cattle gains for John Toedtli, a Colorado rancher.



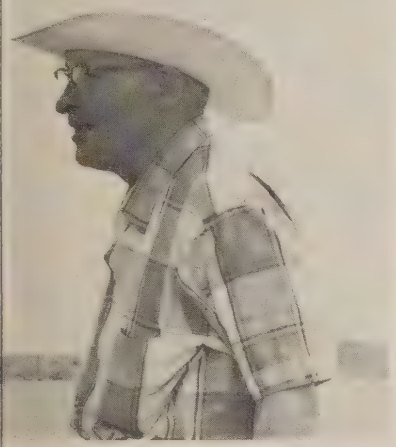
John Toedtli installed a "drinking fountain" at this tank. A pipe bubbles the fresh spring-fed water above the water level in the tank.



John Toedtli, on the left, and his father, William Toedtli, on the right, get together frequently with Joe Krebs, SCS district conservationist, to discuss future conservation plans for the ranch.



Because of managed grazing, yearlings on the Toedtli ranch come off the grass at least 40 pounds heavier. The cattle have water within easy walking distance.





Toedtli plans to slope these gullies and seed them to stop erosion.

ment that would give the range a chance to improve.

Toedtli said it was cheaper to lay miles of pipeline to the various pastures and provide the necessary windmills than to drill wells. "Wells in this part of the country are 500 to 1,000 feet deep," he said.

Most of the Toedtlis' water is now pressure pumped to each pasture. They still use a few windmills and springs. One spring delivers 10 gallons a minute. John winters cattle in this area. The water never freezes. "When it got 28° below zero last winter, steam was really pouring out," said Bill Toedtli.

John Toedtli is a firm believer in pitting his hardland pastures, which he does with an eccentric disc-type pitter.

"It really pays off in summer when we get 1 or 2 inches of rain in 10 or 15 minutes. Normally the rain would all run off. But the pits hold it on the land and let the water soak in. We pitted our first pasture in 1969. Now, that pasture has more grass in the fall after grazing than it used to have in the spring," said John.

He has an irrigation reservoir which when full will hold 625 acre-feet of water. He uses it to irrigate 90 acres of alfalfa. The last 7 years, however, have been dry. Last year the reservoir only irrigated 40 acres of alfalfa. It is fed by a spring and runoff from 11 square miles of drainage.

The water delivery system from the reservoir to his irrigated hayland was improved by installing an 18-inch concrete pipe. Before, it took an hour for water to travel the old ditch from the reservoir. Now it takes only 6 minutes.

The Toedtlis have just about spent their $25,000 ceiling of cost share funds allowed in the Great Plains Conservation Program. They've spent about $27,000 of their own money on conservation practices.

Altogether under the Great Plains program they've installed 54,682 feet of stockwater pipeline, 49,949 feet of cross-fencing, 3,075 feet of concrete ditch lining, 20 stockwater tanks, 2 spring developments, 1,100 cubic yards of diversions, 2,500 cubic yards of dikes, and 1 well. Almost 6,000 acres have been pitted and 95 acres seeded.

"We still have some critical area seeding for which we'd like to get cost sharing, but we'll probably do it on our own," said John.

"We need to bank slope some gullies and fertilize and seed them to stop erosion," he said.

In addition to ranching, John Toedtli is active in the community. He is a supervisor of the Peetz Soil Conservation District. And Bill Toedtli, not to be outdone by son John, was honored this year as conservation rancher of the year in the Goodyear Conservation Awards. ♦

conservation in action

Get a grip on your grass

When you like raising high-quality registered Herefords, you have to give special attention to your rangeland.

Leonard Lodoen farms north of Westhope, North Dakota, on beachline sands that are very fertile but highly erosive. Lodoen is a young farmer, and his main interest is the registered Hereford business. He joined the Great Plains Conservation Program in 1970 because he wanted to increase his cow herd and establish high weaning and yearling weights.

His first need was for spring grass pastures; one of crested wheatgrass to begin the season, and one of bromegrass. One pound of alfalfa per acre was planted with the crested wheatgrass and brome because of its nitrogen and protein contribution.

The second need was to establish high-producing native pasture for summer use—mid-July to September. The area previously used for summer pasture was almost 100 percent in Kentucky bluegrass of low vigor. Kentucky bluegrass has the same season of use as tame grasses (crested wheatgrass and brome) without the productivity. Lodoen plowed the area in 1972 and this year seeded native grasses—western wheatgrass and green needlegrass.

Dugouts and cross fences were built for stockwater and grazing distribution. A new well will provide fresh water late in summer.

These changes have helped stabilize the soils, increased beef production with low per unit costs, and allowed Lodoen to concentrate on raising quality registered Herefords.

With good grass stands, rotation and deferred grazing, reliable water, and fertilization, Lodoen believes he can double production without abusing the land.—PAUL F. L. HAROLDSON, *soil conservationist, SCS, Westhope, North Dakota.* ♦

GPCP works for young and old

Marcus Witte and David Kruse are ranchers in northern New Mexico. They have much in common. Both believe in range management, including brush and erosion control, seeding, and other soil and water conservation practices. Their cattle are fat and healthy and bring top market prices. Both participate in the Great Plains Conservation Program, which is administered by the Soil Conservation Service.

There is one difference, however. Witte is 73 years old, and Kruse is 23.

The Witte operation is in colorful country—atop a broad mesa near Pecos, New Mexico. Kruse's ranch is on lower ground—on the rolling hills near Wagon Mound, the town named after the mountain resembling an old covered wagon.

Both men have had to overcome rangeland problems, but



Marcus Witte, a 73-year-old rancher in Pecos, New Mexico, feeds some of his cattle while talking to Dave Carter, SCS district conservationist at Pecos. As a participant in the Great Plains Conservation Program, Witte often gets advice from the Soil Conservation Service.



David Kruse, on the left, a 23-year-old rancher, and Harold Dineen, SCS district conservationist at Mora, New Mexico check the results of deferred grazing practices on Kruse's ranch.

their range management practices and a lot of old-fashioned work are paying off, and they can see the results.

Witte started his ranch from a 1921 homestead. Through the years he has acquired adjacent lands and now owns nearly 6,000 acres. Most of this is rangeland. He leases an additional 480 acres and has a permit to graze 133 cattle from September 1 to November 30 on the Barbero allotment of the Santa Fe National Forest.

Pinyon-juniper invasion is a serious problem on the rangelands in this area. Witte by himself has cleared 1,112 acres and plans to clear 250 acres more.

Witte has installed 28,688 feet of distribution pipelines from his headquarters well. A large storage tank and numerous drinking troughs provide water for livestock and game on most of his ranch.

To spread runoff water and correct headcutting in gullies, Witte constructed two diversion dikes—one is 216 feet long and the other is 400 feet long. His ranch roads are partially graded and are well drained to prevent soil loss.

Witte has made good use of cost-sharing funds provided by GPCP, and he isn't finished yet. He has 580 acres that need conservation treatment.

Young Kruse is a native rancher; he grew up on the land. He has started a conservation grazing system on his 4,100-acre ranch aimed at systematic and efficient production of first-class cattle. This year he marketed 90 head at a "good" price.

His latest conservation work under the Great Plains program has been installing ponds and water retarding dams.

Kruse, a graduate of Highlands University, Las Vegas, New Mexico, likes ranching. "With a lot of hard work and the right conservation practices, it pays off," he said.—LOUIS H. LASH, *public information specialist, SCS, Albuquerque, New Mexico.* ♦

From gully to grass

The roar of water rushing through a gully after every heavy rain is not a pleasant sound—especially when the gully is on your land and the sound reaches you from a quarter of a mile away.

Carl Lindlauf farms near Voltaire, North Dakota, and he had such a gully a couple of years ago. A long mile of grass has replaced that gully, and rainwater passes silently over the area. And it's certainly easier to farm the adjoining fields now.

The new grassed waterway and a lot of other conservation practices became possible when Lind-

lauf tied his operations to two important agreements. One was with the South McHenry Soil Conservation District and the other with the Soil Conservation Service. Through SCS, Lindlauf became a participant in the Great Plains Conservation Program. His contract, signed April 28, 1971, covers 1,475 acres of land; 1,059 acres of that is gently rolling cropland.

Lindlauf's goal was to increase his livestock operation, but he wanted to correct his erosion problems as well. His big gully was so deep that farm machinery could not go across it. By converting his less productive land to grass, he was able to achieve both goals. In the process, he discovered that the Great Plains program is tailor made for his purposes.

In June 1971, the Soil Conservation Service planned and designed a grassed waterway 5,810 feet long and 94 feet wide. It was shaped and seeded shortly afterwards. It was damaged slightly by heavy rains in the spring of 1972 but has now been repaired and reseeded.

To slow runoff into the waterway and protect adjacent land from wind and water erosion, Lindlauf farms the field in 20-rod strips. He also has planted 20,000 lineal feet of single-row tree belts at 40-rod intervals.

In addition to his waterway, tree plantings, and stripcropping, Lindlauf seeded 87 acres of cropland to permanent grass in 1971, 70 acres in 1972, and 156 acres in 1973. He also built a 1,800-cubic-yard stock dam for better grazing management.

Lindlauf's conservation practices that are not cost shared include proper hayland management on 202 acres, pasture management on 138 acres, proper range use on 60 acres, and crop residue management on 1,000 acres.—DENNIS D. ROSCOE, *district conservationist, SCS, Towner, North Dakota.* ♦

Planned grazing systems work in "bluestem country"

The planned grazing system concept is perhaps the most significant idea to come riding across the Kansas rangelands in many years. Lewis Freeman and his wife Estelle of Elk County think so, because planned grazing systems have worked well for them.

Before 1966, most of Freeman's 130 cattle grazed yearlong on native-grass pastures. Some grazed on rented pasture in summer. The Freemans were putting out more than 100 tons of hay each winter and feeding 4 or 5 pounds of 20-percent protein supplement daily to each cow.

In 1966, after getting planning assistance from the Soil Conservation Service, they planted a field of sudangrass-sorghum and then rotated the cows between rangeland pastures and the sudangrass-sorghum pasture when it was ready. They noticed the bluestem grass made good recovery while the cows were off of it in late summer; it furnished a lot more



Lewis and Estelle Freeman of Elk County, Kansas, are firm believers in a planned grazing system.

grass in winter, which reduced hay consumption.

In 1967, the Freemans started rotating grazing periods between rangeland pastures to give the native grasses in each pasture a rest during the growing season. This practice has been widened to include every piece of rangeland on the ranch.

"The improved vigor of the better grasses—big bluestem, little bluestem, indiangrass, and switchgrass—has increased forage production by at least one-third," remarked Freeman. "Hay needs have been reduced from 100 tons to about 21 tons and protein supplement to one-half."

In 1970, after one of the hottest and driest summers on record, the Freemans had plenty of grass left for wintering their increased herd of 200 cows. "The extra vigor built up in the deep-rooted grasses paid extra dividends when the drought hit," said Estelle Freeman.

How do the Freemans decide when to rest a pasture? They watch the "key plants" such as little bluestem. When the bluestem is about half used, they move the cattle to another pasture. In dry years, this move will be sooner; in wet years, it will be later. Each pasture is usually rested at least 2 months—about one-half of the growing season.

The Freemans still rent other rangeland from neighboring landowners. The neighbors like what they see in the way of grazing management on the Freeman pastures and are changing the rigid lease arrangements on their land to allow flexibility. This will allow a planned grazing system to benefit their land as well.—GLENN P. SNELL, *district conservationist, SCS, Howard, Kansas.* ♦

GPCP shows him the "big picture"

Bill Carpenter, of Scott County, Kansas, says the Great Plains Conservation Program helped him to see how his whole conservation farming program fitted together. He and his son-in-law, Larry O'Bleness, farm 2,400 acres on the Kansas High Plains.

An old "drylander," Carpenter decided to irrigate part of his farm in 1966. He drilled two irrigation wells and began his long struggle to use each gallon of water to its fullest extent.

His search for the best methods of irrigating ended with a Great Plains Conservation Program contract. He ended up with a conservation plan for the nonirrigated cropland as well as a long-range irrigation development plan designed to fit his particular needs.

"The long-range planning made me think in terms of 10 years and longer," remarked Carpenter. "My objective now is to hold all the water I can get and wear it out by using and reusing it as long as I can."

Carpenter terraced the nonirrigated cropland fields with federal cost sharing under his GPCP contract. The terrace channels were built extra wide and flat for good distribution and infiltration of water. Companion practices are stubble mulching and contour farming.

"These practices do more good than the terraces, but terraces control the runoff from heavy rains and prevent erosion," Carpenter said.

The system for irrigating 800 acres of cropland was also designed for total use of all available water. Water is pumped through underground pipelines to minimize water losses. The entire acreage was leveled for efficient control and distribution of water. And finally, 3 miles of waterways collect the irrigation tailwater and storm runoff in 2 pits for reuse in the irrigation system.

Carpenter indeed wears out all the water he pumps and all the water that falls on his farm.—JAMES HABIGER, *RC&D Project Coordinator, SCS, Minneapolis, Kansas.* ♦

Review

Salinity—A Water Quality Problem. By Carl Anderson, Sheldon Boone, Glen Loomis, and Walter Ochs. *1973. USDA-Soil Conservation Service, Task Force Report. 122 pp., illus.* Discusses the West's problem of high salt concentrations in water, which affect crop yield and production costs and limit water use for municipal and industrial and fish and wildlife purposes. Reports on SCS and USDA concern and involvement in the problem in the Colorado River Basin and Colorado's Grand Valley area. Presents USDA's statements from the Federal-State "Conference in the Matter of Pollution of the Interstate Waters of the Colorado River and Its Tributaries." Cites recommendations for potential future SCS activities and programs.

How to Control a Gully. Written by C. J. Francis, 1961; revised by R. C. Barnes, Jr., *1973. Farmers' Bull. 2171. 16 pp., illus. $0.25.* Describes conservation practices for preventing or controlling gullies. These practices not only help to reduce soil erosion and sedimentation but also help the farmer to increase the economic value of his land.

List of Published Soil Surveys. *1973. USDA-Soil Conservation Service. 16 pp.* Lists the soil surveys published by the U.S. Department of Agriculture since 1899 and tells how copies can be obtained.

Conservation Tillage. Proceedings of national conference sponsored by Soil Conservation Society of America (7515 Northeast Ankeny Road, Ankeny, Iowa 50021) in cooperation with American Society of Agronomy, American Society of Agricultural Engineers, and National Association of Conservation Districts. *1973. 242 pp., illus. $5.* The 33 reports by individuals in the fields of research, education, and industry cover the concept of modern tillage, management principles, environmental considerations, and economics. Soil properties, weeds, disease and insect control, importance of nutrient availability, wind and water erosion control, irrigation, stubble mulching, double cropping, and equipment are some of the topics discussed. A summary of the general acceptance of minimum tillage is included.

Meetings

November

11–16 American Society of Agronomy, Crop Science Society, Soil Science Society of America—Joint Annual Meeting, Las Vegas, Nev.

12–14 Geological Society of America, Dallas, Texas

12–16 National Water Resources Association, Phoenix, Ariz.

12–16 American Association of State Highway Officials, Los Angeles, Calif.

12–20 National Grange, 107th Annual Session, Lincoln, Nebr.

25–27 American Society of Farm Managers and Rural Appraisers, Denver, Colo.

December

2–5 National Conference on Access to Recreational Waters, Fort Lauderdale, Fla.

2–6 National League of Cities, San Juan, Puerto Rico

2–8 National Association of Manufacturers, New York, N.Y.

5–6 Twentieth Annual Meeting of Keep America Beautiful, Inc., New York, N.Y.

5–7 Western Forestry and Conservation Association, San Jose, Calif.

11–14 American Society of Agricultural Engineers, Chicago, Ill.

January

14–17 North American Game Breeders and Shooting Preserve Association, Inc., Sacramento, Calif.

16–17 National Council of Farmer Cooperatives, Washington, D.C.

17–19 American Farm Bureau Federation, Atlantic City, N.J.

18–23 American National Cattlemen's Association, San Diego, Calif.

20–24 National Association of Home Builders, Houston, Texas

23–26 National Woolgrowers Association, San Diego, Calif.

31–Feb. 2 Sixth Annual Catfish Farmers of America Convention and Trade Show, Memphis, Tenn.

Recon . . .

Your own information center. About a year and a half ago, SOIL CONSERVATION carried an article about the Westmoreland County Conservation District's Environmental Information Center. Since then, the Pennsylvania district has had requests for its *Directory of Environmental Information* and for details on establishing an information center from practically all of the 52 states, Canada, and even Thailand. The mechanics for establishing an environmental information center and a program for providing environmental information to the public are available from the Westmoreland County Conservation District, 415 S. Main Street, Greensburg, Pa. 15601. Include a self-addressed stamped envelope with your request.

Soils and sewage systems. A pilot RC&D program to provide technical assistance to homeowners and homebuilders in planning and constructing sewage disposal systems is underway in the East Central Vermont RC&D Project area. The program, administered by two natural resources conservation districts, contains provisions for research on the ability of various soils to absorb sewage effluent. The Environmental Protection Agency is processing a grant application for the program.

Ecological parking lot. One of the nation's first "ecological parking lots" was installed recently at a new town being built north of Houston. The half-acre lot is paved with a recently developed porous asphalt that allows rainwater to seep through and eventually return to the natural water table. A battery of instruments, some imbedded in the pavement, will monitor the performance and effectiveness of the material. An adjacent lot will be conventionally paved for comparison purposes.

A 12-inch bed of rock underlays the test lot, creating a reservoir capable of storing 5 inches of rain until it percolates into the soil.

Also being studied is the new town's drainage basin as the area changes from undeveloped land to urban land. An innovative drainage system has been designed to conserve water and retain the forested character of the 18,000-acre town site.

Sewage sludge study slotted. Scientists at the Agricultural Experiment Station of the University of Minnesota, St. Paul, are studying methods for applying sewage material—sludge—on agricultural land, while controlling pollution of surface and ground waters through a program of total water management. The Metropolitan Sewer Board of St. Paul and the Soil Conservation Service are cooperating in the 1-year study. Primary site for the study is the 60-acre research watershed of the Rosemount Agricultural Experiment Station, Rosemount, Minnesota.

Adopt a stream. Volunteers are caring for eight streams flowing into Lake Champlain from New York and Vermont under an "Adopt a Stream" program sponsored by the Lake Champlain Committee, a citizen group with 1,800 members. The program was established to give citizens an opportunity to help restore and improve the streams in the Champlain Basin. The Committee has workshops to provide guidance in setting up programs that include water quality sampling, pollution monitoring, cleanup of riverbanks, acquisition of flood plain or natural areas for preservation and public use, and establishment of educational activities for schools.

Free firewood. Prompted by predictions of a long, cold winter and expected shortages in heating fuels, the U.S. Department of Agriculture is allowing more people to cut firewood in national forests—at no charge.

Christmas trees go on giving. Last year, after Christmas, Rhode Island's South County Garden Club collected 800 discarded Christmas trees and placed them along a 200-foot-wide beachway to help reduce dune erosion. And in Albany, New York, used Christmas trees were fed through a shredder and reduced to mulch for soil protection and enrichment.

Many groups are reported planning "treecycling" projects for this year. *The Avant Gardener*, a horticultural news service, says that whole trees make fine snow fences and sun and wind screens for exposed broadleafs; whole or cut-up trees are excellent fillers to control erosion in gullies; and a single tree can serve as a birdfeeder in a backyard if suet, bacon fat, and containers of seed, peanut butter, or other foods are attached to it.

More conservation assistance. The Public Advisory Committee on Soil and Water Conservation at its recent meeting made several recommendations to the U.S.

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D. C. 20401

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
U. S. GOVERNMENT PRINTING OFFICE
AGR 101

MOVING? Send present mailing label and new address, including zip code, to Division of Public Documents, U.S. Government Printing Office, Washington, D.C. 20401.

Department of Agriculture concerning conservation and other land uses. Committee recommendations included the following:

—That the Secretary of Agriculture vigorously pursue action to lift manpower ceilings for soil and water conservation personnel;

—That USDA provide more resource information to state and local officials and other decision makers in land use planning;

—That the Soil Conservation Service accelerate the completion of modern soil surveys because of their important relationship to land use planning;

—That USDA resubmit its proposal to implement the land inventory and monitoring authority as provided in the Rural Development Act of 1972.

EPS (Environmental Protection Saint). The National Wildlife Federation reports that the Vatican recently announced that St. Anthony the Abbot may now be "officially invoked" as the patron saint of the environment. St. Anthony's papal appointment was apparently awarded because of the 11th century conservation practices of the monks of the order later named after him.

Anthony, an Egyptian who lived in the 4th century A.D., spent the bulk of his 105 years living in caves and existing on bread, salt, and water. The Hospital Brothers of St. Anthony, however, were once widely famed for their tree planting zeal and their tenacity in land reclamation.

Strippers in sheep's clothing. Overgrazing by cattle is serious, but overgrazing by sheep can be worse—they can strip the ground of cover very quickly. And there are reasons to anticipate problems. Lew Yarlett, SCS regional range conservationist for the West, notes that scarcity of petroleum products has hurt the manufacturers of synthetics, and as a result demand for wool has shot up. Sheepmen and district supervisors will have to take care that the increased demand isn't met by denuding the land of cover.

Go West! In a paper entitled "A Future of Population Growth in Accord With National Needs," presented at a seminar on "Development and Population: Alternative Futures in the West," at Colorado State University, Victor Koelzer, former chief engineer for the National Water Commission, urged that the federal government subsidize the development of small growth centers in the West to accommodate future population increases and help relieve environmental problems in the overcrowded metropolitan centers of the East.

Koelzer believes that existing water supplies in such areas as the Upper Colorado River Basin should be reserved for industrial and municipal uses instead of for future irrigation projects.

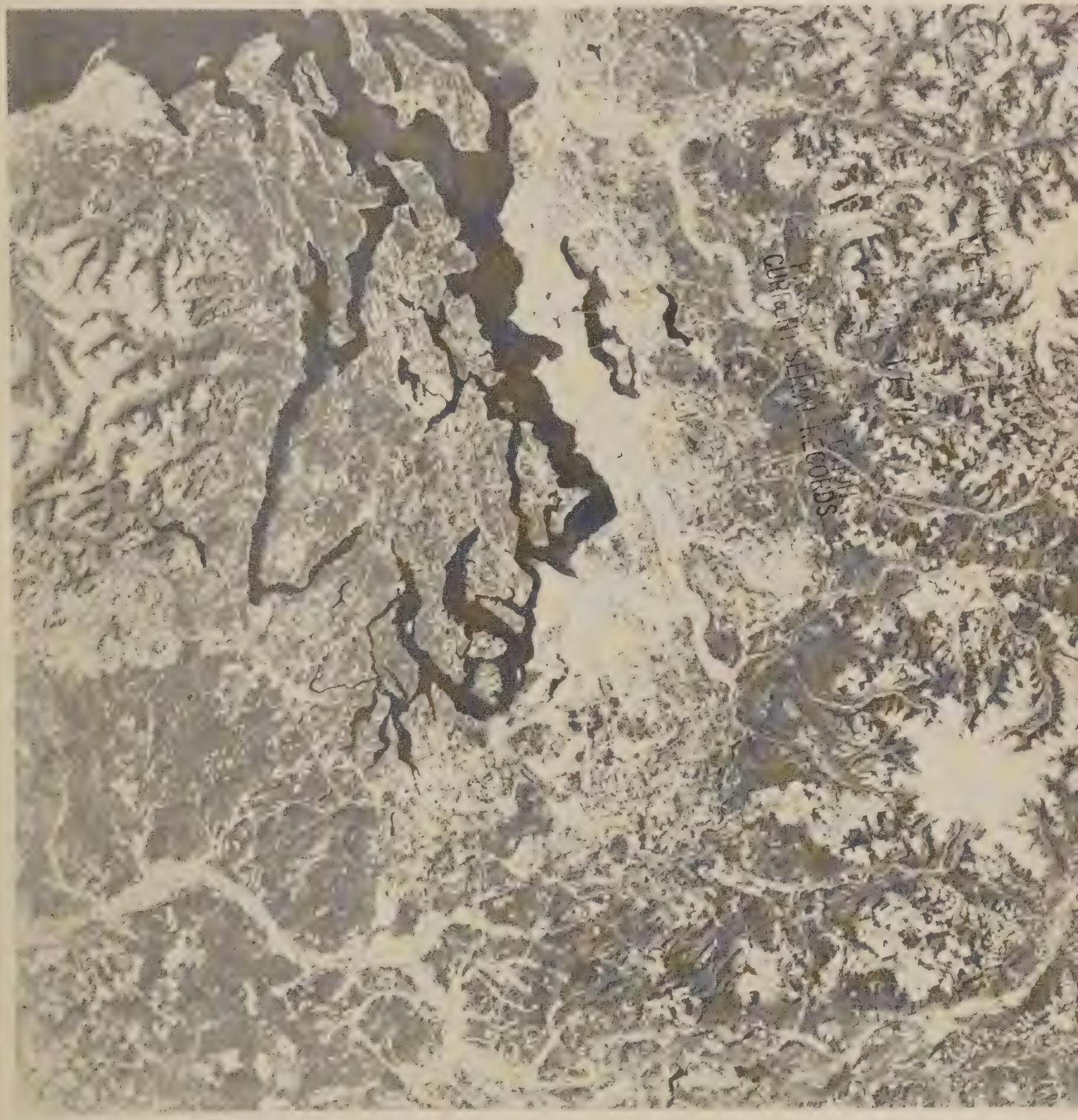
Rather than spending an estimated $500 million for authorized irrigation projects which have not as yet been started, Koelzer argues that these funds should be used instead to encourage industrial growth in the area.

.6
035

SOIL conservation

U. S. Department of Agriculture/Soil Conservation Service/December 1973

39/5



A look at the United States—from space

Land-use planning

The first broad national land-use program, which encourages states to exercise control over land uses of more than local significance, may become a federal law in 1974. These land uses are: (1) areas of critical environmental concern, (2) areas impacted by key facilities, (3) large-scale developments, and (4) areas proposed for developments of regional benefit. This law can add major new dimensions to the concept of environmental protection and social well-being.

It has become clear that many of the problems of maintaining environmental quality are difficult to resolve effectively in the absence of enlightened land-use policies. We need only to look around us to see that too many land-use decisions have been unwise; that too many have been based on short-term expediency rather than on long-term planning.

The Department of Agriculture recognizes that major responsibility for land-use planning rests with local and state governments. Through its agencies, including the Soil Conservation Service, the Department administers many programs that influence the land-use decisions of private land users—urban as well as rural.

The Department's research, educational, technical, and financial assistance services are available in every state and county of the nation. Its agencies assist many levels of government in land-use planning and implementation efforts, and its delivery system for land-use information is widespread.

Recently, Secretary of Agriculture Earl L. Butz issued a statement on land-use policy, a major part of which is printed in this issue of SOIL CONSERVATION. The statement outlines the assistance that the Department will provide to help assure the kind of land-use planning programs that can protect and improve the nation's natural resources.

A national land-use planning assistance act can be a critical component in any strategy for guiding or directing the way land is developed. It can provide an opportunity for federal, state, and local governments to redefine their roles in land-use planning and regulation, and to work together to formulate long-range solutions to environmental problems.

Kenneth E. Grant

SOIL conservation

December 1973, Vol. 39, No. 5

Contents

2 From the Administrator
4 Altering Alabama's history
by W. B. Lingle
7 Grass is right on rights-of way
by O. L. Helmick
8 Terraces no problem
by John M. Cross
10 The center of rural excellence
by Gene Warren
12 A look at the United States—from space
by Vincent J. Price
14 Improved channel improves a neighborhood
by Terry E. Smith
15 Soils tour
by Christopher Williams
16 Terraces for flood control
by Bruce Kidman
18 New hope for New Lexington
by George L. Schmelzer
19 Sanitary landfills on the rise
by Frank J. Jeter, Jr.
20 Willing to learn and willing to do
by Edgar F. Baumann
21 Statement on land-use policy
23 Review
23 Meetings

COVER: Puget Sound and Mount Rainier as seen from 565 miles in space. This is part of the mosaic the Soil Conservation Service compiled from imagery scanned by satellite (See p. 12). To the west of the Sound are the Olympic Mountains and to the east are the metropolitan areas of Seattle and Takoma, with Mount Rainier to the southeast.

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

EARL L. BUTZ, Secretary of Agriculture.

KENNETH E. GRANT, Administrator, Soil Conservation Service

PHILLIP A. CHAVEZ, Editor

MARYELLEN BERTRAM, Editorial Assistant

SOIL CONSERVATION, the official magazine of the Soil Conservation Service, is published monthly by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. Use of funds for printing this publication approved by the Director of the Office of Management and Budget, July 17, 1973.

Reprint permission: Contents of this magazine may be reprinted without permission. Credit is not required but is appreciated. Photographs are available on request.

Commercial names: Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscription: $3.50 per year, $4.50 foreign. Single copy, 45 cents. Discount of 25 percent on orders of 100 or more sent to same address. Order direct from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Altering Alabama's history

by W. B. Lingle
State conservationist, SCS
Auburn, Alabama

In 1819, the Alabama State Legislature chose Cahaba as the state capital. But a flood damaged the town in 1825, and the capital was moved to Montgomery. And that's how it's been. Since those early days, floods have altered the history of Alabama.

But the situation is changing. Today, projects to help reduce flooding and conserve resources are having a lasting and beneficial effect on the state. The Watershed Protection and Flood Prevention Act (Public Law 566, as amended) is bringing to people in flood-prone areas not only protection from floods but also opportunities for community growth and improvement.

The city of Heflin, for example, is moving to take full advantage of its PL-566 multipurpose watershed lake. The 84-acre impoundment at the edge of the city provides 637-acre feet of municipal water. Escar Wood, mayor pro tem and city council member, said that everything except the filtration plant is ready. Heflin officials are waiting approval from the Department of Housing and Urban Development of a grant to share the cost of completing the plant.

"The lake will supply all the water we expect to need," Wood said, "so we hope to bring in more industry. We missed out several times in the past because we could not promise new industries the water they needed. We

A 23-acre watershed lake on Hurricane Creek, near Bluffton, Alabama.



could not even allow existing plants to expand. We have been using drilled wells and pumping everything we can pump. The water table has been dropping and our wells are gradually failing."

Before it was improved, High Pine Creek in Randolph County was clogged with silt and debris, and it flooded three to five times every year. People were leaving Roanoke and the surrounding area in droves. Those that stayed were left to search for solutions to the area's resource problems.

Use of land along the meandering stream was severely restricted. Sediment in Roanoke's water-supply reservoir had reduced its capacity by one-third in 7 years; water rationing was normal during dry seasons. The sediment interfered seriously with water purification.

Today, 209 surface-acres of water are stored in nine flood detention reservoirs. Water rationing is no longer needed in Roanoke, and fishing and water sports are popular again in the area. The reservoirs were designed to catch and store 836 acre-feet of sediment during the next 50 years without impairing their effectiveness.

"Our town has made steady progress since our water supply reservoir was completed in 1961," said J. C. Phillips, mayor of Roanoke. "We have extended the city limits and added new water and gas lines for residential and industrial use. Naturally, we attribute this growth and development to our dependable water supply." The 51,000-acre High Pine Creek Watershed Project that brought this about was completed in 1966.



A multipurpose lake in the Choccolocco Creek watershed. It helps prevent flooding and stores the water supply of Anniston, Alabama.

The Choccolocco Creek Watershed Project near Anniston is another example of multiple use of floodwater retarding structures. Two reservoirs help prevent flooding and store the water supply of Anniston and Oxford.

A multipurpose structure in the Talladega National Forest has water stored for recreational use. There, people can enjoy fishing, camping, boating, water skiing, and other sports in the quiet atmosphere of a secluded spot in the mountains.

A multiple-purpose dam planned for the Cypress Creek watershed will provide recreation areas for Florence State University. This impoundment will cover 71 surface-acres and will contain 280 acre-feet of water.

Small watershed projects have brought 95 flood detention dams to Alabama. Seven of these impoundments also store water for municipal and industrial use, three for irrigation, and two for recreation.

Alabama has a rich heritage, beautiful scenery, and one of the country's most unspoiled environments. The framework of locally sponsored watershed projects offers many ways to improve these values as well as the economy. ♦



Grass is right on rights-of-way

In West Virginia, new transmission line rights-of-way receive what is virtually a landscaping treatment in a program devised jointly by the Soil Conservation Service and the Monongahela Power Company.

When the Monongahela Power Company constructed a new 500,000-volt line from Fort Martin to Mount Storm, it saw the need to protect the land from erosion and the lines from tree limbs.

The company asked the Monongahela Soil Conservation District for technical assistance in revegetating and stabilizing the land disturbed by construction equipment under the towers and the miles of powerline. A plan was prepared that included diversion ditches and water control devices to protect against erosion from runoff water.

The Monongahela Soil Conservation District worked on a number of springs under the newly constructed line so that all the water from the springs was piped into water troughs. This not only kept the water free from silt but also provided fresh water for livestock, wildlife, and other uses.

When Monongahela Power started construction on another line between Clarksburg and Weirton, company officials again consulted with SCS. This new line was scheduled to transverse the Upper Buffalo Creek watershed, where a flood prevention project is underway. Previous experience indicated that simple erosion control practices, such as diversion ditches followed by seeding of bare soil, would minimize erosion and prevent sedimentation of streams.

Curt Foreback, a forester with Monongahela Power, knew the importance of controlling erosion near the 12 flood prevention dams in the watershed. With the help of SCS and the Monongahela Conservation District, he drew up a plan for revegetating the disturbed areas. The plan was written into the contract for building the line, and the contractor is now implementing the requirements. Monongahela Power officials hope to use this same method in future line projects.

After a total plan of revegetation was written, the first step was to prepare a seedbed. Next, lime and fertilizer were applied in amounts determined by soil tests. Then the land was seeded by a tractor-drawn cyclone-type seeder. Within a year, the area should be ready for use as pastureland or as a home for wildlife.

To make lines readily accessible for quick repair, the company maintains a low-growing cover of shrubs, forbs, and grass on its rights-of-way.

In addition to controlling erosion, the low-growing shrubs and grass provide excellent food and cover for birds and other wildlife.

James S. Bennett, the SCS state conservationist in West Virginia, believes that this joint effort between the Soil Conservation Service and Monongahela Power Company "is proving time after time to be a sound investment in natural resources management as well as a solution to many maintenance problems." ♦

Tall fescue is replacing a temporary cover of rye on this right-of-way in Taylor County, West Virginia.

by O. L. Helmick
District conservationist, SCS
Morgantown, West Virginia

Terraces no problem

by John M. Cross
Public information specialist, SCS
Lincoln, Nebraska

Ralph and Harry Wilson, a father-son team, vote in favor of terraces on center pivot irrigated fields. They have them, they like them, and the terraces do a lot of things for their farm in Clay County, Nebraska.

"The land wouldn't be worth much without the terraces," Harry claims.

The Wilsons have two center pivot irrigation systems. One is a $14,000, 13-tower rig that waters 135 acres in a 2½-day cycle. Wheels must cross and recross 6,480 feet of terraces protected by good grass and two grassed waterways. Corn rows follow the terraces.

The other system is used on a quarter section almost too level to need terraces, although the Wilsons are considering putting in a couple on a sloping side.

"Any problems with tower wheels crossing the terrace ridges," we asked. "None at all," Harry replied. "A little water collects in the wheel track in the channel of the terrace but causes no problem. If it rains during the irrigation season, the terraces ease the water onto the grassed waterways and out of the field."

In the 135-acre irrigated circle there are 115 acres of corn, about 8 acres of grass on the terraces and waterways, and more than 7 acres of grass around a pond. "We don't have any wasted land within the sweep of the system," Wilson assured us. The silt loam soil has a good infiltration rate.

The terraces were built in 1959 before the Wilsons acquired the farm. A well and an old pivot system were installed in 1963. An old rig had been in operation since 1948 and had to be replaced. But even the old rig crossed the terraces without trouble.

The terraces and waterways do much more than help control runoff. They feed cattle.

The Wilsons buy 500 calves each September and turn them into the field after harvest. The calves have 23 acres of good grass plus 115 acres of corn stalks—instant feed. From the field they go into the feedlot. "Cattle seem to gain better when they've been on the grass and stalks first," explained Harry. It would be hard to put a dollar figure on the value of the forage, but he knows it is significant, mainly because of the amount of feed saved.

Water for the cattle is provided by a 2½-acre pond in a corner of the field. Should there be any tailwater from irrigation, which isn't likely, the pond catches it as well as runoff from rain and snow.

More ducks nested near the pond last year than ever before. Pheasants are plentiful there, and deer come around a couple of times a year.

But if a man didn't have terraces on an irrigated field, would he build them? Kenneth Keasling from Harvard, Nebraska, provided the answer. He was in his third year of operating a center pivot system on 117 acres, 35 of which were "pretty rough," when he decided to terrace. "I was willing to try them," he said.

He had a washout in a draw through the field in which the end tower would get stuck. He had tried dikes in another field to solve the same problem, and they caused a gully.

George Remmenga, a Soil Conservation Service district conservationist, figured Keasling needed about 8,000 feet of terraces. Keasling is a participant in the Great Plains Conservation Program, which makes him eligible for cost sharing. This helped him with about 5½¢ a foot on the terrace construction. Keasling wants to save his land, whether an irrigation rig has to cross terraces or not.

Those who have terraces and a center pivot irrigation system like them; many who don't have the terraces want them. Remmenga is asked a lot of questions about terraces by farmers cooperating with the Upper Big Blue and Little Blue Natural Resources Districts, where he is assigned. He lets men like Harry Wilson, who have experience with terraces, help him answer the questions. ♦

Grassed terraces and a center pivot irrigation system have proved to be a good combination on this farm in Clay County, Nebraska. Cattle graze the fields after the corn is harvested.



The center of rural excellence

by Gene Warren
Public information specialist, SCS
Alexandria, Louisiana

The people of LaSalle Parish, Louisiana, are winners. The U.S. Department of Agriculture selected the LaSalle Parish Rural Development (RD) Committee as tops in the nation in 1972 and gave it the Department's Distinguished Service Award.

"When you get right down to it, the main objective of our RD Committee is to make this parish a better place in which to live and work," is the way Committee Chairman H. D. Gaddis put it.

A group of hard working, fast thinking people have just about accomplished that objective. More than 1,500 new jobs have been created during the past few years as a result of several new industries coming into the parish. And at a time when most rural parishes are losing people, LaSalle Parish's population increased by nearly 1,000 during the past year. "Young people want to stay, and new people keep coming here because there are jobs and the area is healthy and beautiful," Gaddis said.

The Rural Development Committee is made up of representatives from the Louisiana Cooperative Extension Service, the Soil Conservation Service, the Agricultural Stabilization and Conservation Service, the Farmers Home Administration, and the Louisiana Forestry Commission. But the committee gives much credit to its subcommittees on tourism and recreation, health and housing, industrial development, and agriculture and forestry.

Action projects that helped the committee win top honors are numerous and impressive. One such project several years ago helped establish a feeder-pig program which brought a new source of farm income. "Local people got behind this project from the beginning," Gaddis said. "Our peak year brought $1,000,000 in sales from pigs in LaSalle and the four adjoining parishes. Most of the farmers who sell pigs here need to supplement their incomes. About 350 farmers sell at the monthly auctions."

As an outcome of the feeder-pig project, a feed mill was built that in turn led to the development of an industrial park. Townspeople raised more than $50,000 to buy the park site. The park has already attracted several industries employing more than 600 people. A shopping center is to be built there soon.

The RD Committee was instrumental in bringing in the new plywood mill at Urania and the garment plant in Olla, which together employ more than 800 parish people.

"As long as they have a place to work, rural people living on small farms will stay in the community," said Fred Shiel, secretary of the LaSalle Development Board, which works with the Rural Development Committee in creating attractive working conditions.

The committee also helped set up the new farmers market at Jena where farmers sell their produce twice a week.

It assisted in forming a sewage district which serves 3,000 parish people, and seven rural water districts. Eventually, more than 1,700 rural families will benefit from new water-supply systems.

The committee has helped nine schools in the parish with erosion control measures. Cooperating with the LaSalle Soil and Water Conservation District, the committee assisted each school in developing a conservation plan that led to shaping and seeding of the grounds. "Much of the work was done by the police jury and other local people," said Tommy Biles, the SCS district conservationist at Jena. "The students also helped, and several schools developed outdoor classrooms for teaching conservation."

LaSalle Parish has only 13,000 people, but the subcommittee on tourism and recreation has big-city ideas. "Soon we will have an amphitheater here in Jena, and we expect to draw people to theater productions from all over the state," said Mrs. Mary Ann Sleeth, chairwoman of the committee. The theater was funded

by a state grant and local money.

The committee has also promoted the Catahoula Lake Development area and the creation of a wildlife refuge to attract waterfowl. It helped spark the civic pride that led to a parish vote for taxes to build a center to hold the parish fair, rodeos, senior citizen activities, music programs, and other events.

People everywhere in LaSalle Parish are talking about the good things happening there in central Louisiana. A lot of credit, they say, goes to the RD Committee and those who helped put progressive programs into action. ♦



The industrial plant in the background is one of several that the LaSalle Parish Rural Development Committee helped bring to the parish. In the foreground, left to right, are Tommy Biles, SCS district conservationist at Jena, Louisiana; Fred Shiel, secretary of the LaSalle Development Board; and H. D. Gaddis, chairman of the Rural Development Committee.

A look at the United States —from space

by Vincent J. Price
Information Division, SCS
Washington, D.C.

The first "satellite" maps of the United States are being made by the Soil Conservation Service's Cartographic Unit in Hyattsville, Maryland.

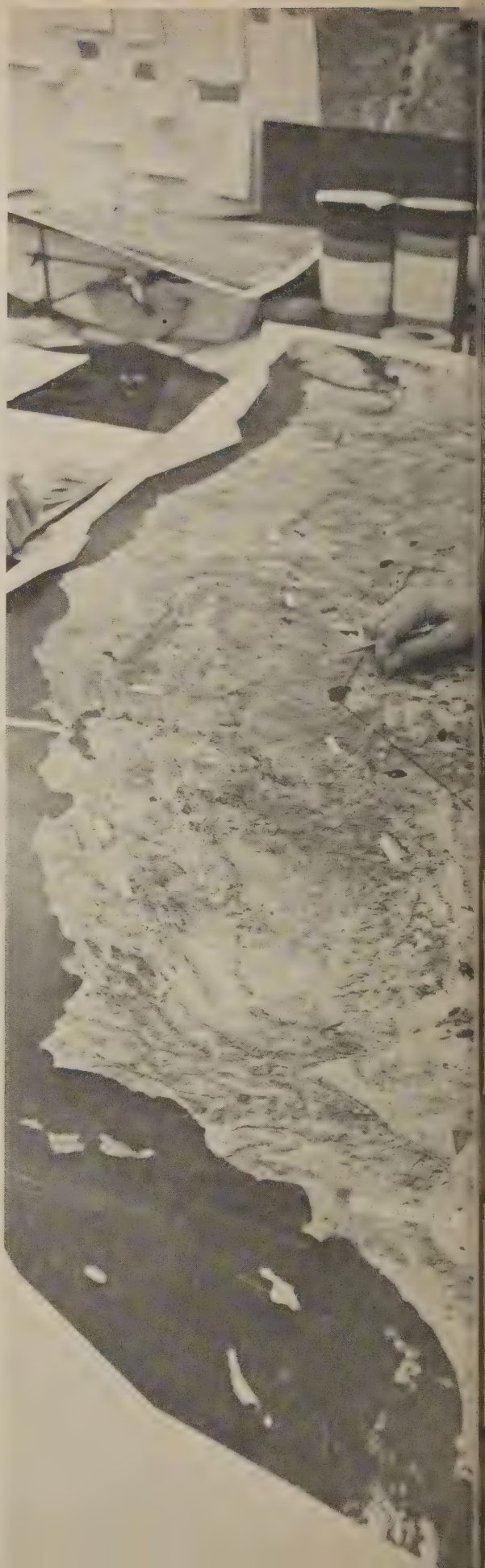
The maps, technically called mosaics, are based on images received from a satellite, but the land is not obscured by cloud cover and the mosaics conform to a standard map projection. Mosaics of much of the country are already on sale to the public.

The images for the mosaics come from the National Aeronautics and Space Administration's Earth Resources Technology Satellite (ERTS) Program. ERTS-1 was put into orbit on July 23, 1972. Scanning devices within the satellite immediately began measuring reflectance and radiation from the land 565 miles below. The data are transmitted to ground receiving stations and converted to photograph-like images that can be rectified and joined into mosaics.

NASA contracted with SCS to produce mosaics of the United States by combining into one picture the 700 individual scenes that ERTS-1 scanned of the 48 contiguous states. That, however, is easier said than done. Two main problems confronted the SCS cartographers.

First, cloud cover and atmospheric haze usually obscure most of the land below. Second, the ERTS images, because they are precise, do not conform to essential distortions of map projections. Unless the images are either printed on a surface that conforms to the curvature of the earth or corrected to counter the distortion, many of the ERTS images cannot be mounted together with precise matching of imagery throughout the assemblage.

Because of its soil survey program, SCS has long experience in making mosaics from aerial photographs. But to mosaic the ERTS images,





Ralph M. Hooper, an SCS cartographer, looks over the West Coast as it appears on a 1:1,000,000-scale mosaic of the United States.

a new system had to be developed. "We really had to get away from the conventional concepts of making mosaics to do this compilation," explained Ralph M. Hooper, the SCS cartographer who developed the ERTS mosaic system.

ERTS-1 imagery is scanned in 110-mile-wide strips. Every 18 days, the satellite completes an orbit and begins to scan the same scenes. Thus, with several images of the same scene to choose from, SCS is able to eliminate the parts obscured by cloud cover and atmospheric haze and substitute clear images. The result is a 99 percent cloud-free view of the country.

That left the problem of distortion. To prevent a major loss of precision in transferring the images onto a flat surface, the cartographers adjusted the scenes to fit a standard map projection, the Albers Equal-Area Projection. Two standard parallels were taken at 45°30′ and 29°30′. At these two parallels the proportions were kept perfect. Between the two parallels the east-west dimensions of each scene were decreased and the north-south dimensions were increased. North of 45°30′ and south of 29°30′ the opposite was done—the height of each scene was lessened and the width inversely magnified.

The resulting proportions, when printed on a flat surface and mounted according to detailed procedures, give a map of great accuracy. An estimated 90 percent of the features shown are within a few hundredths of an inch from their true position—and this on a mosaic that is 10 feet by 20 feet!

SCS is making four different mosaics of the 48 contiguous states. The scanning devices in ERTS-1 are sensitive to different bands of the spectrum—green, red, near infrared, and infrared. SCS is making two mosaics from red spectrum imagery and two from infrared—one in each band from scenes scanned during the summer and one in each from winter imagery.

The red band is sensitive to green plants. The infrared band is sensitive to heat reflection; because water absorbs heat and land reflects it, the infrared band imagery gives very distinct contrasts between land and water.

The mosaics show mountains, lakes, reservoirs, rivers, major streams, and geologic formations such as faults and escarpments. Vegetation and the lack of it—forests, deserts, cropland—show up more clearly on the red band mosaics. Water areas and drainage patterns are clearer on the mosaics made from the infrared imagery.

All four mosaics are black-and-white and could easily be mistaken for photographs.

SCS is reproducing the mosaics in seven scales. A mosaic at the 1:5,000,000 scale comes in 6 sheets. Mosaics at the 1:1,000,000 scale come in either 17 or 54 sheets. Other mosaics are made from enlargements of these two scales.

All of the summer imagery mosaics will be available by April 1974. Mosaics of all but the easternmost parts of the United States are already available. For information about the mosaics, write to Cartographic Division, Soil Conservation Service, Federal Center Building No. 1, Hyattsville, Maryland. 20782.

"It's fascinating work," reported Ralph Hooper. "As each panel is put in place, we can see the United States unfolding. And we're the first to see it, which is exciting. Others have seen it piecemeal, but we're getting the whole picture." ♦

Improved channel improves a neighborhood

by Terry E. Smith
Project construction engineer, SCS
Victoria, Texas

Forty families in Port Lavaca, Texas, wanted a natural channel running through their backyards improved, but they also wanted their backyards left intact, with trees, shrubbery, fences, and other improvements.

With that thought in mind, Soil Conservation Service engineers set out to plan the Chocolate, Little Chocolate, and Lynn Bayou Channel Improvement Project. The project area is in south central Calhoun County; the work is sponsored by the Calhoun County Drainage District No. 11.

Lynn Bayou, in its natural state, meandered somewhat through the 40 backyards, adding much to the beauty of the landscape. Because of this, very little realinement was made in the improvement work.

This concrete drop structure lowers water from one level to another without causing erosion and prevents encroachment of salt water from Lavaca Bay into the channel.



Front-end loaders were used for excavation so that the spoil could be spread under trees and utility lines along the channel. Side slopes were constructed smooth, and the excavated earth was blended into the sloping yards. When the grass is established, it will be possible to mow most of the channel slopes with a lawn mower.

Extreme care was exercised by the construction crew to protect all large trees outside the excavated area. Brush that was removed and all trash were hauled out of town for disposal.

A concrete drop structure was constructed in the improved channel at the point where fresh water from the watershed meets sea water from Lavaca Bay. This structure prevents encroachment of the sea water into the improved channel. White rock riprap was used to stabilize the banks near the drop structure. When construction was finished the entire area was seeded to grass.

The people in the channel improvement area feel that the SCS project improved not only their backyard bayou but also the entire neighborhood. ♦

Soils tour

by Christopher Williams
District conservationist, SCS
Phoenix, Arizona

"I was surprised to discover how much soils can vary in the short distance of 20 miles," said an environmental planner for the city of Phoenix on a "soils tour" of central Maricopa County, Arizona.

The purpose of the tour was to make urban and environmental planners and engineers more aware of the many uses of soils data.

The tour was conducted by Soil Conservation Service people from three field offices and sponsored by a local natural resource conservation district. A team composed of a soil conservationist, soil scientist, engineer, and district conservationist gave the participants a rundown on all aspects of soils, soil surveys, and the use of interpretive maps and tables.

Bussed from one site to another, the participants dug holes with an auger and observed, compared, and discussed handfuls of soil.

At one stop, where a soil profile was exposed, two volunteers were asked to try to delineate the horizons of a soil profile by plugging sticks at the approximate dividing lines. They soon learned that it takes a knowledge of soils, as well as a trained eye, to accurately delineate horizons.



Delineating the horizons of a soil profile by plugging sticks at the approximate dividing lines.

Participants on an SCS "soils tour" examine handfuls of soil.



Shovels were passed out at one of the stops, and some of the participants began digging at a preselected site on cropland. A few feet down they struck a caliche hardpan, which gave opportunity to discuss the limitations of the site for buildings and septic tanks.

Another soils tour is being planned. This time realtors will be invited. ♦

Terraces for flood control

by Bruce Kidman
Civil engineer, SCS
Santa Fe, New Mexico

In 1970, Aztec, New Mexico, had finally had it up to its "first-story windows" with flood problems.

Large floods had occurred in 1932, 1938, 1941, 1954, and 1965. The 1965 flood caused about $30,500 in damages in this city of 3,700 people. The big floods were bad enough, but smaller, more frequent floods occurred almost every year.

The city had asked the Soil Conservation Service for help under the small watershed protection program, but the waiting list for help was long. The SCS area office was able to provide planning assistance, but there was still no financial assistance. Then

These flood control terraces above Aztec, New Mexico, were built to contain runoff from a 100-year-frequency storm.



a commitment for partial funding of a pilot watershed project came from the Four Corner's Regional Commission (FCRC), which is set up to distribute federal grant-in-aid funds in economic development regions.

An engineer, hydrologist, range conservationist, biologist, and economist from the SCS area staff and a geologist from the SCS state office made up the planning team that was charged with producing an abbreviated plan within 30 days.

Four alternatives were presented to the city. These consisted of single elements and combinations of floodwater retarding structures, flood control terraces, and a floodwater diversion plus conservation treatment of the entire drainage area.

One floodwater retarding structure, 7,000 feet of terraces, and supplemental land treatment measures were selected as the best plan for reducing flood damages.

FCRC put up $22,000 to build the terraces, which were completed in the spring of 1972.

The terraces, with a capacity to contain runoff from a 100-year-frequency storm, were built on approximately 108 acres of the 654-acre drainage area. Normally considered a soil conservation measure, these oversize terraces are a major structural component for flood prevention in this watershed. Their effectiveness was proved in the fall of 1972 when a severe thunderstorm hit the community. They prevented an estimated $50,000 in damages from floodwater runoff.

The slope of the land on which the terraces were built ranged from 4 percent to 20 percent. A typical terrace cross section is 30 feet wide at the flat channel bottom, has 2:1 side slopes on the dike, a 10-foot top width on the dike, and is 2 feet from channel bottom to the crest of the emergency spillway.

A 100-year-frequency storm will pond water in the terraces with no discharge. The water will dissipate through seepage and evaporation. Testing of the soils prior to design indicated rapid infiltration.

Most of the upper drainage area is rangeland with sparse vegetation, steep slopes, and much gully erosion. A land treatment program is planned which includes 4 miles of fencing to help control grazing and indiscriminate vehicular traffic; 113 small grade control structures; control of competitive shrubs; 42,000 feet of range furrowing; and 100 acres of seeding.

One might suppose that an average annual rainfall of 8.5 inches wouldn't do much more than settle the dust occasionally. But when the rain comes in high intensity, short duration storms and falls on steep, unprotected slopes, the flood and sediment problems are just as real as anywhere else. Houses, commercial and institutional buildings, roads, and irrigation canals on the 209-acre flood plain are all subject to flood damage.

Water is short in New Mexico and a wary eye is kept on its use by the New Mexico State Engineer. He determined that a water right of 2.3 acre-feet per year would have to be satisfied on this project. The city of Aztec has obtained this water right.

Plans for the future call for obtaining funds to complete the land treatment program and the floodwater retarding structure that will control runoff from 468 acres. In the meantime, the terraces are performing very well. They have paid for themselves several times over already. It must be stressed, however, that complete effectiveness will not be obtained until all planned components of the system on the entire watershed have been installed.

One local unit of government, one state agency, and two federal agencies moved in a cooperative, coordinated effort and got this project underway—and before the next flood season came around. ♦

New hope for New Lexington

by George L. Schmelzer
District conservationist, SCS
Somerset, Ohio

A large earthen dam is being built across a broad valley just north of New Lexington, Ohio. Hope for future community development and prosperity for the village's 5,000 people grows with the dam.

In June 1950, houses and businesses in the flood-prone area suffered $63,000 in damages. Periodic flooding alternating with severe water shortages has emphasized the need for the dam.

"Our existing reservoir is just not adequate," remarked Paul Shumaker, the village administrator. "Increasing water demands made our situation worse each year."

"Possible new industry has been lost to this area because of the water shortage," said Mell G. Underwood, Jr., the special council for the village. "Some of our existing industries threatened to leave if something was not done."

In 1971, the water shortage became critical. All carwashes were closed, and people were asked to use as little water as possible. No new hookups to the water system were allowed. Because of the no-hookup rule, the new high school could not open until water was available.

Back in 1958 the community had applied for federal assistance. The Soil Conservation Service made an investigation of possible dam sites for flood protection and water supply. Other aspects of the proposed project were checked to determine if the project was feasible under Public Law 566—the Watershed Protection and Flood Prevention Act.

SCS prepared a complete work plan for the Rushcreek Water-

A serene valley near New Lexington, Ohio, is being changed by men and machines. The watershed dam under construction will provide flood protection and water supply for the village's 5,000 residents.



shed Project, detailing construction features, costs, and benefits. And it made funds available for the flood prevention measures of the project.

Chances of the project becoming a reality looked good, but financing to supplement the funds provided by SCS had to be found. Also, a serious pollution problem above the reservoir had to be solved.

The pollution problem eventually was taken care of through the cooperation of local and state agencies. The financing took a little longer—until the Economic Development Administration (U.S. Department of Commerce) provided a grant toward the project. Then the Farmers Home Administration (U.S. Department of Agriculture) came through with the rest of the money by making a long-term loan to the village.

In 1972, above-normal rainfall provided plenty of water to the community, but the villagers remembering critical shortages in the past continued to push for the long-awaited dam until all signals were "go."

Contracts were let in the fall of 1972, and construction began in the spring of 1973. If the weather permits, construction can be completed by the end of 1973. It will be some time yet before the dam is full of water, but for the people of New Lexington the future looks bright already.

Their new 44-acre lake will have a capacity of 163 million gallons. The water will be piped to the existing treatment plant, which can adequately treat the water from both the new and old reservoirs. "The new water supply impoundment will eliminate our water shortages for the foreseeable future," said Underwood.

The Rushcreek Watershed Dam, meeting the needs of the community, will allow the people of New Lexington to plan for future growth. ♦

Sanitary landfills on the rise

by Frank Jeter, Jr.
Public information officer, SCS
Raleigh, North Carolina

As an alternative to open dumps, many of which are being closed in light of antipollution action, sanitary landfills are fast becoming the most popular method of solid waste disposal.

In North Carolina, a survey by the Soil Conservation Service showed that 180 landfills, either still in use or already filled, are located in the state's 100 counties. And 79 landfills are in the planning stage.

Of the 180 landfills, SCS—working through soil and water conservation districts—assisted with 88. In the 79 planned landfills, SCS assistance was requested for almost every one.

SCS can help units of local government, whether county or municipal, in landfill site selection. Its data and technical assistance can help insure that surface and underground pollution of soil and water will not occur in the disposal area.

"We know that some of the older landfills, perhaps started years ago, don't quite live up to the definition of 'sanitary landfill,' " commented Jesse Hicks, the SCS state conservationist in North Carolina, "but quality evidently is getting better as use of this method of waste disposal increases."

Hicks explained that not every available tract of land is suitable for use as a landfill. Underground water movement or unfavorable soil characteristics may make a site unsuitable.

A sandy loam or similar soil is best. Dense clayey soils or water saturated soils can pose problems, and an area with heavy deposits of stone may be impossible to work or digging operations there may be very costly.

Most sanitary landfills consist of a large trench where refuse is deposited then compressed with heavy machinery. Each day's waste is covered with a layer of soil. When the trench is completely filled, it is sealed with a heavier layer of soil, covered with available topsoil, and planted in grass or other protective vegetation.

SCS assistance generally includes onsite inspection of the area under consideration or a detailed soil survey of the landfill site. Often resource inventory and evaluation reports provide useful data to municipal or county officials who have the responsibility for selecting a site.

All these services have been provided by SCS in every part of North Carolina during recent years, and the trend is expected to increase as landfill use expands.

"Often we find a cooperative effort on the local level," Hicks said. "We have counties operating landfills that are also utilized by a city, and the other way around. Health departments often cooperate. We of course are glad to provide SCS expertise to all units of government." ♦

Willing to learn and willing to do

by Edgar F. Baumann
District conservationist, SCS
Pendleton, Oregon

Leg work, head work, and just plain hard work. This pretty well sums up the year's activities of the Southern Umatilla Soil Conservation District's Junior Board.

Determined to bring young people in this eastern Oregon wheat-growing area into its programs, the Southern Umatilla Soil Conservation District appointed its first junior board in 1972.

That year the junior board worked mainly in promoting environmental education activities in the area. Four junior board members acted as counselors at the Outdoor Education School and distributed conservation literature to sixth graders there.

Building on this first-hand experience with the educational process and realizing that much more than training sixth graders was needed if their community was to increase in environmental awareness, the junior board formed a program of action that would hit several areas of environmental needs.

The 1973 plans included getting involved in Pendleton's long-range beautification program for the Umatilla River, which flows through the city. The board members planned two ecology poster contests for local schools—one for grades 5 and 6, the other for grades 3 and 4. Last spring, during Soil Stewardship Week, they delivered soil stewardship materials to local churches.

The junior board contacted the County Superintendent of Schools about placing a series of environmental teaching guides in schools. These are the guides provided by the National Council of Garden Clubs and the Women's Auxiliary of the National Association of Conservation Districts.

Not content to be planners and coordinators, the junior board asked for and received training in packaging and planting the kinds of shrubs used in windbreaks, which are much needed in this windy country.

Hoping for some help to multiply their efforts, junior board members have asked local schools to select 10 students with an aptitude for the outdoors to accompany Pendleton outdoor education teachers on visits to other Oregon schools where outdoor education is a regular part of the curriculum. This cadre of "experts" could then be called upon to help establish outdoor learning areas on school sites throughout the county. They could also be used as teaching assistants at outdoor learning areas.

To help the junior board members see the big picture of community conservation needs, the senior board has taken them about the county for a first-hand look at conservation practices.

Ed Hoeft, chairman of the Southern Umatilla Soil Conservation District, is convinced that the junior board is adding a new dimension to district activities and proving to be a valuable resource in itself. ♦



C. J. Gilbert, vice chairman of the board of the Southern Umatilla Soil Conservation District, points out some of the conservation practices on his farm to three members of the conservation district's junior board (from left to right) Becky Kuiken, Ann Lorenzen, and Patty Jo Fields. Tom Warren, SCS state forester, stands in the background.

Statement on land-use policy

The following is excerpted from the Secretary of Agriculture's memorandum 1827, issued on October 26, 1973.

Purpose. The Department (of Agriculture) recognizes that major responsibility for land-use policy (planning and regulation) rests with local and state governments. The Department also recognizes the rights and responsibilities of landowners and users in making land-use decisions within this framework. Fifty-eight percent of America's land is in private hands, 75 percent held by farmers and ranchers. Another 8 percent in National Forests and National Grasslands is managed by the Department, while 6 percent is owned by state or local governments. Through its agencies the Department administers some 80 programs that influence private as well as governmental landholders' land-use decisions—urban as well as rural. This memorandum establishes Departmental policies to help assure sound public policy to maintain and improve the nation's natural resources.

Policy. The Department will:

Adapt present pertinent programs to help enhance and preserve prime agricultural, range, and forest lands for those uses.

Promote and help influence the management of rural lands to assure adequate sources of high-quality water.

Intensify establishment of permanent soil and water conservation on the erosion-vulnerable lands returned to cultivation to help increase production of crops and livestock.

Expand the Department's efforts to assure wider understanding of how its programs and responsibilities contribute to improved land uses.

Cooperate fully with other Departments in terms of responsibility for policy and leadership.

Further coordinate the work of the Department's agencies at the state level to make all its land-use efforts relevant and harmonious.

Provide timely information and assistance including non-farm interpretations of soil surveys, small watershed hydrologic data, and economic information to local, county, and state land-use decision makers.

Strengthen and expand the Department's capabilities in harmony with others for surveying and monitoring land and related natural resources and to provide resource condition evaluations to local, county, state, and federal governmental land-use decision makers.

Help protect rare and endangered plant and animal species and their ecological systems as well as historic, cultural, scientific, and natural systems.

Help conserve and develop significant waterfowl habitat lands.

Assist in the reclamation of land surfaces used for the extraction of non-renewable resources such as coal, minerals, oil, and gas.

Work with other agencies to discharge fully the responsibilities authorized and directed to the proposed Interagency Advisory Board on Land-Use Policy.

Land inventorying and monitoring. In providing additional resource information to local and state governments the Department will expand at the earliest feasible time its surveys and studies to include:

A nationally recognized system of land classification.

County, state, regional, and national inventories of available soil, water, and related resources and projections as to land-use potentials.

Guidelines to identify critical environmental

problems to be considered in state and local land-use policy planning.

Physical, social, economic, and institutional information for evaluating national policy questions concerning agricultural, forestry, and other rural land uses. Also analyses of factors producing land-use changes.

Identification, location, and productivity ratings of farm, range, and forest land.

Research on emerging issues concerning land resource and water use, supplies, and requirements. In so doing take into account alternative environmental, institutional, and demographic factors and both short- and long-term national and international needs.

Program emphasis. Department agencies will direct their programs to the extent possible—including redefinition or modification of their policies—to:

Increase production of detailed soil surveys.

Establish land-capability criteria to help direct the flow of urbanization to land areas least suited to crops and forests.

Help guide urban growth to preserve prime farm lands, minimize fragmentation of land holdings, provide adequate water supplies, equalize taxes, dispose waste properly, and provide adequate public health, recreation, and safety services.

Plan and guide effectively land use in the rural-urban fringe areas and in recreation or second-home subdivisions.

Control erosion and reduce sedimentation.

Minimize the impact of surface mining on rural land uses.

Locate sites for solid waste disposal as an increasingly important land use.

Give attention to need for small watershed, flood plain, wetlands, and coastal zone management programs based on comprehensive land-use planning incorporating ecological considerations.

Encourage multiple-use management of forest lands to assure a continuous supply of forest goods and services with environmental objectives.

Manage farm, ranch, and forest practices to minimize adverse effects on the environment.

Implementation guidelines. The Department and its agencies will be guided by the following purposes in policy implementation:

(1) To conduct programs within state and federal environmental standards.

(2) To conserve and improve land and related resources.

(3) To enhance the amenities and social assets of rural America.

(4) To seek fair returns for farms, forests, and ranches as economic units.

(5) To support research and education on land-use planning.

(6) To promote economic development in the rural areas.

(7) To assist all citizens and agencies to obtain technical data needed for planning.

(8) To continue to act in concert with federal, state, multijurisdictional planning and development agencies and local agencies. Also with quasi-public and private organizations and individual landowners and operators.

Review

Books

Environmental Geomorphology and Landscape Conservation. Vol. 1: Prior to 1900. Edited by Donald R. Coates. 1972. *State University of New York at Binghamton. Dowden, Hutchinson & Ross, Inc., 523 Sarah Street, Stroudsburg, Pa. 18360. (Distributor outside the United States and Canada: John Wiley & Sons, Inc.)*

The interaction of man and nature, and the unwitting or uncaring disregard of natural values sometimes exhibited by man is a subject of increasing concern and study. As Dr. Coates states in his introduction to this volume, man has acted on, with, and against his environment during his entire tenure of earth.

The Benchmark Series, of which this volume is a part, represents a collection and republication of papers relevant to the subject—the relationship of man and his environment. The 33 articles in this volume constitute some of the best early literature available on man's involvement with surface features of the earth. For many readers of SOIL CONSERVATION, several of these writings would largely be inaccessible were it not for this volume.

The general subject of environmental geomorphology is defined by the editor to include (1) study of geomorphic processes and terrain that affect man, including hazard phenomena such as floods and landslides; (2) analysis of problems when man plans to disturb or has already degraded the land-water ecosystem; (3) man's utilization of geogmorphic agents or products as resources, such as water or sand or gravel; and (4) how the science of geomorphology can be used in environmental planning and management. Landscape conservation is defined as constructive attempts by man to live more harmoniously with his environment, often by helping nature to help itself.

The early awakening of man's insight into environmental problems and values is described in the articles, which were either written before 1900 or document conditions before that date.

Included are some glowing reports of the fairness of the new land in America. Robert Beverly of England in 1722, for example, stated, "The soil is of such variety, according the difference of situation, that one part or other of it seems fitted to every sort of plant that is requisite either for the benefit or pleasure of mankind."

Also included is an excerpt from what the editor describes as the first comprehensive book on the impact of man on nature, "The Earth as Modified by Human Action," by George Perkins Marsh, published in 1877.

Two articles discuss reasons for the fall of the Roman Empire. Three articles argue that major climatic changes, and not mismanagement of land resources, were the main causes of the disappearance of advanced cultures.

The oldest discussion of early environmental problems is provided in the translation of selected writings from about 60 A.D. by L. Junius

Meetings

December

- **2–5** National Conference on Access to Recreational Waters, Fort Lauderdale, Florida
- **2–6** National League of Cities, San Juan, Puerto Rico
- **2–8** National Association of Manufacturers, New York, N.Y.
- **5–6** Twentieth Annual Meeting of Keep America Beautiful, Inc., New York, N.Y.
- **5–7** Western Forestry and Conservation Association, San Jose, Calif.
- **11–14** American Society of Agricultural Engineers, Chicago, Ill.

January

- **14–17** North American Game Breeders and Shooting Preserve Association, Inc., Sacramento, Calif.
- **16–17** National Council of Farmer Cooperatives, Washington, D.C.
- **17–19** American Farm Bureau Federation, Atlantic City, N.J.
- **18–23** American National Cattlemen's Association, San Diego, Calif.
- **20–24** National Association of Home Builders, Houston, Texas
- **23–26** National Woolgrowers Association, San Diego, Calif.
- **31–Feb. 2** Sixth Annual Catfish Farmers of American Convention and Trade Show, Memphis, Tenn.

February

- **2–3** Society for Range Management, Tucson, Arizona
- **10–14** National Association of Conservation Districts, Houston, Texas
- **20–22** Land Improvement Contractors of America, Williamsburg, Va.
- **20–23** American Camping Association, Atlanta, Georgia
- **21–22** Southern Forest Institute, Atlanta, Georgia
- **25–Mar. 2** American Association for the Advancement of Science, San Francisco, Calif.

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D. C. 20401

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300
AGR 101

POSTAGE AND FEES PAID
U. S. GOVERNMENT PRINTING OFFICE

MOVING? Send present mailing label and new address, including zip code, to Division of Public Documents, U.S. Government Printing Office, Washington, D.C. 20401.

Columella, the Roman author of at least 16 books on husbandry. Columella refutes the theory prevalent in his time that soils go through an irreversible aging process during man's use of them; he describes how fertility can be maintained. Columella discusses also the evils of city life and the degenerate nature of Roman society and gives his postulation that husbandmen—farmers—are the essential or ultimate bulwark of strength in the society.

Articles by authors well known to many readers of this magazine include "Lessons from the Old World to the Americas in Land Use," by Walter C. Lowdermilk, and two articles on ancient and modern use of soils by Gerald W. Olson of Cornell University.—**Donald E. McCormack,** *Assistant Director, Soil Survey Interpretations Division, SCS, Washington, D.C.*

New publications

Wastewater treatment technology. Second Edition. *1973. Illinois Institute for Environmental Quality, (Chicago). 370 pp. $9.00.* Gives information on existing methods of treatment, levels of treatment attainable, and associated costs for materials found in industrial wastes —arsenic, barium, boron, chloride, copper, cyanide, and others.

Water Pollution Economic and Planning Models. A Bibliography with Abstracts. *1973. National Technical Information Service (P.O. Box 1553, Springfield, Va.). 54 pp. $20.* Fifty-one selected abstracts of research in the areas of pricing policies, urban planning, water resource management, and control techniques.

Preventing Landfill Leachate Contamination of Water. *1973. Gulf South Research Institute (Baton Rouge, La.). 119 pp. $4.25.* Identifies materials that might prove useful in preventing permeation of leachate into ground water.

Methodology for Assessment of Urban Water Planning Objectives. *1973. Texas A&M University (College Station, Texas). 169 pp. $4.75.* An examination of the development, use, and management of water resources in San Antonio, Texas.

Use of Domestic Waste Glass for Urban Paving. *1973. University of Missouri (Rolla, Missouri). 106 pp. $6.45.* Summarizes research on the feasibility of using recycled glass as an aggregate for asphalt pavements.

Study of Lead, Copper, Zinc and Cadmium Contamination of Food Chains of Man. *1972. University of Missouri (Columbia). 121 pp. $4.25.* A statistical study, conducted in Southeastern Missouri, of the contamination of soil, vegetation, meat, and milk.

Photosynthetic Reclamation of Agricultural Solid and Liquid Wastes. *1973. University of California (Berkeley). 94 pp. $3.75.* A study of the development of an anaerobic fermentation and algae growth system to treat all farm wastes with as much material recovery as feasible.

1.6
So 35
cop. 2

SOIL conservation

U. S. Department of Agriculture/Soil Conservation Service/January 1974

39/6



New year, new challenges

In the year just past, the Soil Conservation Service helped more than 30,000 different units of state, federal, or local governments with soil and water conservation plans or problems. This included assistance to planning boards, technical help to zoning authorities and land developers, and consultations with local leaders working to help increase income and improve living conditions in rural communities.

This work will continue in 1974. But it will be coupled with a renewed concern for the problems of America's farmers as they work toward producing more crops—on protected land—during the current year of intensified agricultural activity.

Today's farmers are far more knowledgeable about basic conservation principles than were those of their father's generation. The need for conservation is well understood; the real challenge is to help farmers combine the best methods of crop production with the best methods of soil and water protection so that their land remains fertile and productive—economically and ecologically viable—over a long period of time. As always, conservation district leaders will be in the forefront of this work.

Because the same basic principles of soil, water, and plant management apply to all land whatever its use, it is not necessary to create a new profession for conservation work in urbanizing areas. But—as more people call upon us for help—it is necessary for us to plan new and creative methods of doing more with less money and manpower.

The recognization is growing that the Soil Conservation Service has much to offer in community development work. In addition to consultation with local authorities on specific local problems, we provide technical assistance to resource conservation and development projects, to small watershed projects, and to other formal resource conservation work. And, of course, soil surveys and soil interpretations are well recognized as valuable tools for both the farmer and the town planner.

So, 1974 will be a year of increased conservation concern on both America's farmlands and in her growing towns and cities. In the Soil Conservation Service, we must examine our priorities carefully. We cannot do everything that people want us to do. We cannot even do everything that we want to do. But I am confident that we can, and will, meet our primary obligations to land users and planners in ways that continue to make us proud of our Service—and our services.

Kenneth E. Grant

SOIL conservation

January 1974, Vol. 39, No. 6

Contents

2 From the Administrator

4 Soil survey "infantry" goes airborne
by Bernhard A. Roth

7 Research plus action
by Sharon L. Norris and Dr. Lloyd M. Cox

8 Last of a vanishing breed
by Dan F. Croom

10 Watershed protection project makes it a living creek
by Gordon S. Smith

12 Troops, trout, and Trout Unlimited
by Vincent J. Price

16 No scars on the landscape
by Calvin J. Perkins

18 A timely takeoff with RC&D
by Neal C. Beery

20 Tree farming is good business
by Benny Dobson

22 Don't forget esthetic values
by Philip R. Weatherman

23 Review

23 Meetings

COVER: The Mount Hood region of Oregon.

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

EARL L. BUTZ, Secretary of Agriculture.

KENNETH E. GRANT, Administrator, Soil Conservation Service

PHILLIP A. CHAVEZ, Editor

MARYELLEN BERTRAM, Editorial Assistant

SOIL CONSERVATION, the official magazine of the Soil Conservation Service, is published monthly by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. Use of funds for printing this publication approved by the Director of the Office of Management and Budget, July 17, 1973.

Reprint permission: Contents of this magazine may be reprinted without permission. Credit is not required but is appreciated. Photographs are available on request.

Commercial names: Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscription: $5.65 per year, $7.10 foreign. Single copy, 50 cents. Discount of 25 percent on orders of 100 or more sent to same address. Order direct from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Soil survey "infantry" goes airborne

by Bernhard A. Roth
Public information officer, SCS
Upper Darby, Pennsylvania

Vermont has put wings on the boots of its fence-jumping, bog-slogging, soils-mapping "foot soldiers"—the Soil Conservation Service's soil survey team.

Pioneer surveyor flights in a helicopter have shown it's possible to "skywalk" a rugged Green Mountain township's multithousand acreage.

The initial move toward speedier means of furnishing Vermonters accurately mapped inventories of the riches and hazards of their scenic countryside began in Windham County. Supervisors of the Windham Natural Resources Conservation District have been eager to respond to pressures for soils data sought by fast-growing towns.

The pedestrian pace of mapping the local soils has been frustrating to Windham's community and conservation leaders. Planners clamored for the data needed to head off chaotic siting of homes, schools, shopping centers, and ski centers.

Urgent demands for site facts in many developing towns might well go begging for a decade or longer. The information delivery schedule was hooked to a soil scientist's walking pace—one stride at a time, through all sorts of terrain—as he sampled, observed, and recorded his findings.

The conservation district's decision to try wings on survey operations found a ready volunteer in David Gilman, SCS soil scientist stationed at Brattleboro. A licensed pilot himself, Gilman had long felt that basic facts about Vermont's landscape were quickly revealed to a skilled flying observer. Test hops using conventional fixed-wing planes over survey areas were encouraging.

Feeling there'd be merit in skimming lower and slower—with the option of hovering in midair for closer scrutiny of an area—Gilman judged a helicopter would be most suitable.

The first serious, go-for-broke, soils-inventorying effort using the bird's eye technique took place on a brisk spring morning over Londonderry. Beleagured by the headlong push for new roads, new impoundments, new ski areas, new holiday colonies—and the urgency of planning them intelligently—town officials had willingly agreed to finance the fledgling flight.

In the chopper at lift-off were Gilman and veteran rotorcraft pilot, William Rhoades from Sugarbush Valley, a famed tourist mecca in northern Vermont. Each had done careful homework before soaring up over leafless trees and fields still soggy from thawing snow and ice. And they had briefed each other thoroughly on the flight path, elevations, and safety precautions needed for an efficient sortie.

Gilman had a lapful of aerial photos, arranged in flight sequence, with navigational landmarks clearly plotted on each. His shirt pockets were crammed with pencils and crayons.

Swooping low across London-



Going over the flight plan. William Rhoades (above, on the left), helicopter pilot, and David Gilman, SCS soil scientist, brief each other thoroughly before making a tree-top survey of rapidly expanding Vermont townships. Before takeoff (below), Gilman readies the aerial photomaps on which he plots information while airborne.



derry's ever-changing topography and cataloging its features proved —in Gilman's words—"one of the busiest and most rewarding sessions of survey work I've ever experienced."

For the soil scientist, there was the challenge to summon up his many years' familiarity with the giveaway signs that indicate soil boundaries—and do so in a matter of fleeting seconds—as swamps, grasses, trees, rock outcrops, and other landscape features flashed beneath and around the bubble canopy.

For the chopper pilot, there was the need for instant, reflexive action at the controls to keep the craft on an accurate course, at a practical speed, and at the best observational level above the twisting, dipping, climbing landforms that make Vermont unique among the states.

Checking the results of the flying survey back at his Brattleboro office, Gilman expressed his evaluation in the restrained language of routine agency reports. But the nitty-gritty facts of the airborne inventory were dramatic. He had recorded the major resources of the town's 21,000 acres in approximately 1 hour.

There was still an infantry-type job to be done: spot checking of soil secrets accessible only to the auger and spade; more thorough and closeup scrutiny of



In minutes the flying soil surveyor compiles basic mapping data that normally take days of rigorous walking.

intermingled soil types. Gilman spent 35 days confirming, correcting, and supplementing information logged from the air.

At the end of the period, an accounting of the experiment could hardly avoid an enthusiastic tone.

The objective—to gather all the scientific data needed to compile and reproduce a map of Londonderry's soils—had been achieved. It had been done for approximately $2,000 in basic costs—one-half the usual accepted outlay. More important to many, the time spent in getting the vital information had been cut in half.

To the supervisors of Windham County Natural Resources Conservation District, the results offered hope in responding to 14 towns pleading for soils information.

Interest in the aerial operation sparkled among the ranks of Vermont's SCS men when Gilman narrated his firsthand observations at the invitation of state conservationist, Craig Right, and state soil scientist, Bruce Watson.

"Chopper surveying," said Gilman, "does demand quick judgments and plenty of boning up on the area to be flown. It also needs a person who can make himself comfortable in the air. But the plusses to be gained are more than just speed. From about 200 feet aboveground, which Bill Rhoades and I maintained, you can see how a whole span of features relate to one another—features you miss crawling through the brush.

"As far as I'm concerned, this opportunity to study the land via the 'flying fish-bowl' was the first time I didn't feel like the proverbial ant in the hayfield."♦

Research plus action

by Sharon L. Norris
Information specialist, SCS
Boise, Idaho

and Dr. Lloyd M. Cox
Snow hydrologist, ARS
Boise, Idaho

In Boise, Idaho, more accurate techniques for measuring the water content of snow and for forecasting water supplies are emerging from the cooperative efforts of the Agricultural Research Service and the Soil Conservation Service.

ARS' Northwest Watershed Research Center and SCS have designed a program to get quality measurements from key sites to refine short- and long-term snowmelt runoff forecasts. Electronic facilities, personnel, instrumentation, transportation, and instrument shelters at six remote snow-course sites are shared by the two agencies.

One of the key sites is at the Trinity Mountain guard station on the headwaters of the Boise River at an elevation of 7,780 feet. Typical data telemetered daily to Boise include (1) water equivalent of the snowpack as determined by isotopic gages, snowpillows, and universal gages; (2) water flowing from the base of the snowpack as collected by a 10-foot-diameter melt collector and a 5-foot-diameter universal gage; (3) precipitation as measured by a heated, tipping bucket rain gage; (4) air and instrument shelter temperatures; and (5) various battery voltages and system checks.

Power for the equipment at the site comes from nickel cadmium and sealed lead acid batteries that are trickle charged by several solar panels. A thermoelectric generator is kept at the site for emergencies and for special study use.

More efficient use of personnel and equipment has resulted from this cooperative effort. Also, an ideal situation exists because a research agency is working directly with an action agency. ARS, for example, developed a short-term snowmelt runoff model that has been tested successfully on basins ranging in size from 100 acres to 830 square miles.

A long-term water supply forecast model also has been developed and is proving to be more accurate than forecast models currently in use. A heat balance study of the snowpack has been conducted to refine existing snowmelt formulas.

Research plus action are really paying off in Idaho. ♦



This is what a snow study site looks like before the snowfall covers it up. The water equivalent of the snowpack is determined by measuring the pressure changes inside the snowpillow, in the foreground, as the depth of the snowpack changes over the pillow.

Last of a vanishing breed

by Dan F. Croom
Former public information officer, SCS
Stillwater, Oklahoma

"You load 16 tons, and what do you get?"

If you're strip mining, you get jagged, raw, eroding spoil banks. But coal producers, like Frank McNabb of Catoosa, Oklahoma, are taking aggressive steps to minimize any adverse environmental effects from their mining operations.

McNabb is among the last of a vanishing breed, an independent coal producer. He began reclaiming spoil banks back in 1958 on 450 acres of land. He said that state legislation pending at the time on strip mine reclamation motivated him to turn in that direction.

"I knew it was just a matter of time before we would be required to start reclaiming spoil banks," McNabb said. "I thought I might as well learn as much as I could on my own land while I had the chance."

Sherman Lewis, the Soil Conservation Service's district conservationist in Claremore, has worked with McNabb in establishing permanent grasses on smoothed spoil banks.

"The Oklahoma Legislature did pass a comprehensive strip mine reclamation act in 1967," Lewis said, "but it would be incorrect to credit the legislation totally for what the McNabb Coal Company has done since that time. McNabb has gone beyond the letter of the law to get his mined areas protected from erosion and returned to productive use."

Last spring, McNabb seeded a 35-acre tract of reclaimed land to fescue, lespedeza, and clover. He applied 200 pounds per acre of a balanced fertilizer, which helped get the grass and legumes off to a fast start.

"Limited grazing is an important part of getting these seedings well established. Overgrazing



Frank McNabb (left), an independent coal producer, has revegetated this strip-mined area with bermudagrass and yellow hop clover. Sherman Lewis, SCS district conservationist, periodically offers assistance.

tends to weaken the stand," Lewis commented.

McNabb has discovered that a good job of strip mine reclamation costs money. The reclamation process involves stockpiling topsoil if there is any, smoothing the spoil bank ridges down to a rolling topography, and seeding the area to adapted grasses and legumes.

"The work we've been doing lately has been costing as much as $2,000 an acre," the veteran coal producer said. Then he added, "A good reclamation job has some definite economic advantages. The leasing of mineral rights can get quite competitive at times. It doesn't hurt a bit to take a landowner to a reclaimed area and show him what it looks like when the job is finished.

"The State Mine Inspector's office has used our work as an example for other mining concerns in Oklahoma and in other states," McNabb noted with a measure of pride. Conservationists studying spoil bank vegetation practices have toured his mine sites to observe the work being done.

Reclamation is one of a multitude of tasks that face an independent coal producer. McNabb's list of high priority duties as sole proprietor of his 60-year-old firm includes lease acquisition, exploration, equipment purchasing, personnel management, and sales. Besides all that, he finds time to care for his commercial beef cowherd on his farm southeast of Catoosa.

Acquiring leases is the first step in the coal mining process. Then comes core drilling on 100-foot grids to determine the exact location, extent, and quality of the coal. If the core drilling shows that there's no coal, the site is abandoned and the cost of the lease is absorbed by the firm.

"Of course when you've worked in this business as long as I have, you pretty well know where the coal is and where it isn't," McNabb said. He looks for outcroppings of particular rocks to confirm his notions of where the fossil fuel can be found.

Much of McNabb's mining activities involve reworking strip pits excavated 10 to 20 years ago. In those days, many sites were mined down to about 40 feet. Because of advances in excavating machines, stripping operations now go down 60 or 70 feet.

Production from stripping operations varies, but McNabb said that most areas yield from 2,000 to 2,500 tons per acre. Mineral rights owners are paid a royalty for each ton of coal mined.

Customers for McNabb's coal are scattered far and wide. Shipments are made regularly to Los Angeles, Kansas City, and Mexico. Some sales for domestic use are made in Oklahoma, Kansas, Missouri, and Arkansas.

The use of coal for domestic purposes has declined drastically in the last 30 years. McNabb himself is the only one affiliated with his company who still uses coal for heating his home. He believes, however, that increasing energy demands and shortages of natural gas point to greater use of coal in the years to come.

Regardless of what the future brings, one thing's certain—Frank McNabb will continue reclaiming his spoil banks. He's not a past winner of the title "Conservationist of the Month" for nothing. The honor was bestowed by the Rogers County Conservation District. ♦

Watershed protection project makes it—
a living creek

by Gordon S. Smith
Public information specialist, SCS
Upper Darby, Pennsylvania

"You can't do much fishing in a dry creekbed," cracked Hughson Case, a Franklinville, New York, native.

That was Case's candid description of Gates Creek the way it was 10 years ago. The creek was one of the misused tributaries of Ischua Creek, a major stream in Cattaraugus County.

Flooding and excessive soil erosion were major land and water evils that faced the county 10 years ago. Today, with a self-initiated watershed protection project nearing completion, Gates Creek has come back to life, and the entire 117-square-mile Ischua Creek watershed has had an economic uplift.



The Ischua Creek Watershed Protection and Flood Prevention Project was organized and planned by local conservation-minded people. Hughson Case, a former chairman of the Cattaraugus County Board of Supervisors, was a leading member of this group. Like his friends, he had seen Gates Creek deteriorate from a brook-trout paradise to a "sometimes flooding, sometimes dry" useless stream.

"Fishing in Gates Creek was great when I was a boy," Case recalled. "But, as years passed, the stream filled with mud and debris. Floods grew progressively worse. Then the stream began to run dry during summer."

The Gates Creek problem soon spilled across the community, generating enough interest to get community leaders to apply for federal and state aid in a watershed protection project for the entire Ischua Creek drainage area.

The project was approved, and the Ischua Creek Small Watershed Protection District was formed, according to New York law, with authority to levy taxes, acquire easements and rights-of-way, and let construction contracts. It wasn't long before construction was underway.

"The reasons for this healthy stream going bad are easy to explain," said Homer Stennett, an SCS soil conservationist. "It started years ago when people first moved into the watershed. Harvesting timber and plowing farmland uprooted too many acres of protective land cover. Soil washed away leaving deep gullies. The stream channels gradually filled with the displaced soil. When storms came, floodwater had no place to go. It spread across the valley and into Franklinville."

Many farmers along the stream added to the problem by grazing their cattle along the streambanks. Raw banks replaced natural protective cover. When highwater came, the exposed banks crumbled into the stream. As the raw streambanks dissolved, floodwater carved new channels across the valuable bottomland farms.

"The dry streambed stemmed from the same misused land," explained Stennett. "The soil lost its water-holding capacity as natural cover was torn lose. Most of the rain and melted snow ran off the land causing excessive flooding. When dry summer months came, very little moisture was left in the soil. What little came downstream quickly dropped below the shale bottom of the stream."

Today, a decade later, Gates Creek and the Ischua Creek valley are making a fast recovery. Damaging floods have diminished. Gates Creek never runs dry, and

fishing is getting better.

Erosion control measures got top priority in the overall watershed plan. According to Stennett, farmers have done an outstanding job in protecting their exposed acres. The land treatment has not only reduced the maintenance required for downstream channels and floodwater dams but also has contributed to the overall improvement of the watershed.

Augmenting the land treatment, seven dams, designed by SCS engineers, were built to check excess floodwater. One of these dams formed 30-acre Harwood Lake, which was planned and financed, for the most part, by the New York State Department of Environmental Conservation. The new lake has public fishing facilities.

The last dam to be constructed forms an 80-acre lake for recreation and flood control. The area includes a bathing beach and boating, picnicking, and fishing facilities. It has been named Case Lake in honor of Hughson Case.

While land treatment and dam construction were being carried out, channels were being improved with equal success. Bulldozers cleaned out years of accumulated rock, silt, and debris from clogged channels. Farmers fenced their cattle away from raw streambanks. Basket willow, lespedeza, and other shrubs were planted along these banks to provide cover plus food for wildlife. In some places, streambanks were protected by stone riprap and log cribbing.

Spinoffs from the Ischua Creek project aren't hard to find today. For example, many Franklinville industries considered moving to flood-safe communities just a few years ago. With flood protection insured, these industries decided to stay in Franklinville. Today they are expanding.

Flood damages that had averaged $75,000 a year in the past now rarely exceed $15,000.

Just north of Franklinville, 500 acres of flat land had been flooded too often by Ischua Creek to be used for anything. Today a golf course, clubhouse, and bowling alley complex cover the flood-protected area. This community recreation facility means jobs for 12 people and added tax revenues.

The Ischua Creek Watershed Project is nearly complete. According to Hughson Case, "The benefits already far exceed anything we expected. And we have a living creek now." ♦

In 1955, the creek at left was dry because of poor land management upstream, and cows grazing along the streambanks contributed to the erosion problem. Today, streams like the one below in the Ischua Creek watershed are protected by permanent vegetation.



Troops, trout, and Trout Unlimited

by Vincent J. Price
Information Division, SCS
Washington, D.C.



This is a fish story. Three fish stories, to be exact. Stories of different ways the Soil Conservation Service is helping to create or restore trout habitat.

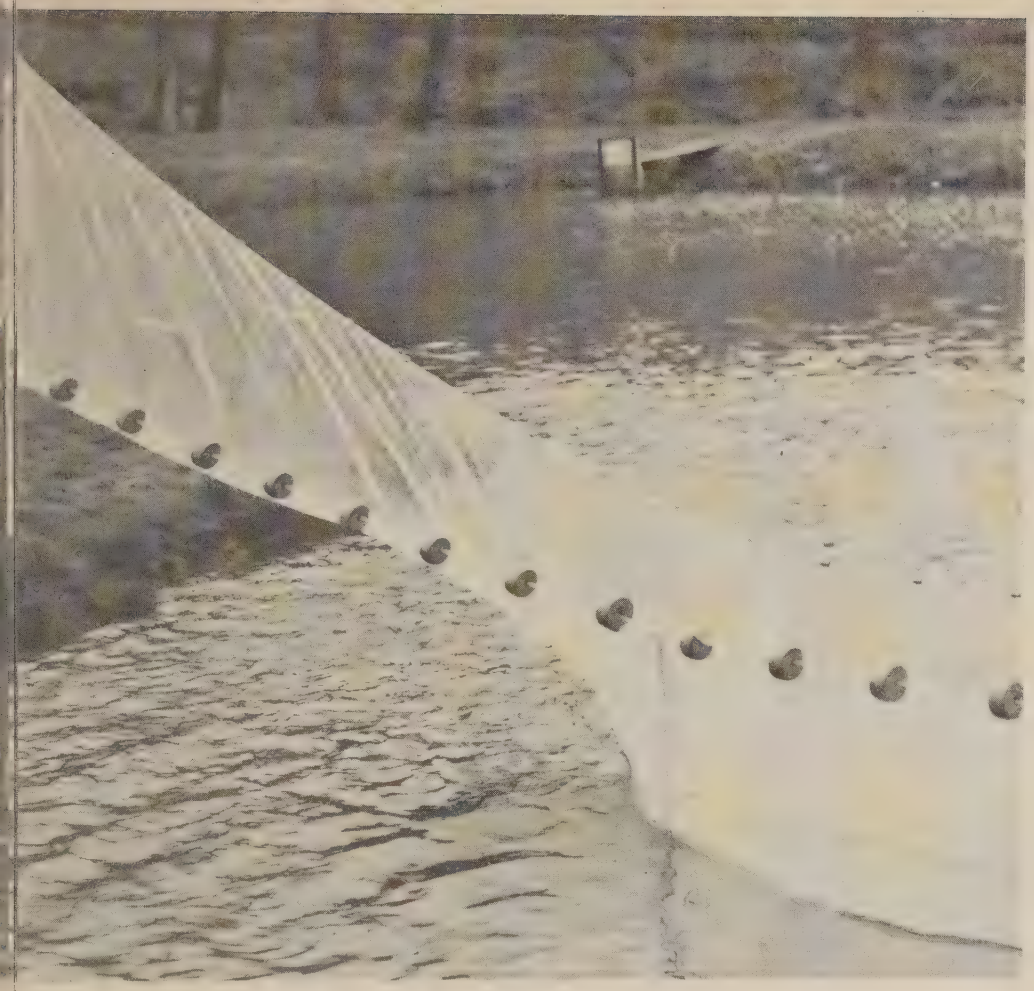
Trout, one of the world's most popular game fish, has lost much of its natural habitat to pollution and land use changes. Offsetting this loss are the efforts of thousands of angler-conservationists. An organization called Trout Unlimited is in the forefront of this effort; local chapters all over trout country are organizing habitat improvement projects.

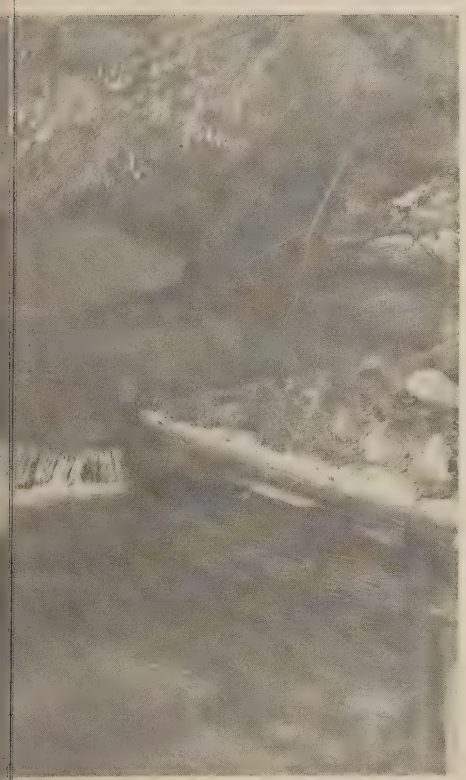
Sometimes Trout Unlimited asks the Soil Conservation Service for help. Years of experience in working with soils, plants, and watershed projects have given SCS the technical expertise that trout fanciers need.

The following fish stories have two things in common: in each, streams have been modified to









Trout Unlimited's Dr. John Woods (above) helps round up stocking trout by seining the nursery pond.
Sportsmen (far left) help collect the trout that will go into McMinn County, Tennessee, streams.
Lloyd Hess (left), a fisheries biologist with the New York Department of Environmental Conservation, checks the water depth in front of a pool-digging structure in the Little Hoosic River. The natural power of the waterfall carves out a cool pool for trout.

provide better habitat for trout, and trout fishermen themselves provided the enthusiasm and leadership to get the project moving.

An anti-erosion army

Stream improvement for trout is sometimes a long, hard, repetitive job—that's when conservationists wish they had a small army of volunteers. At least one group of conservationists literally got an army of volunteers—the U.S. Army.

Chautauqua County, on New York's Lake Erie shore, is a summer haven for increasing numbers of second-home owners from Cleveland and Buffalo. This influx has created an increased demand for sport fishing, so Trout Unlimited and the Soil Conservation Service started a program to preserve and restore trout habitat in the county's Mill Creek.

Flooding had severely damaged Mill Creek's banks. Streambank erosion was changing the creek from a cool, deep trout stream to an intermittent shallow creek.

One immediate but minor step was to improve the channel in a few places where the stream had fingered out. Channelization restored the "splintered" streamflows back into one channel.

The major task was to revegetate 1,000 feet of streambank. Horticultural students at two vocational-education schools provided 12,000 young purple-osier willows grown from shoots. And the Chautauqua County Soil and Water Conservation District and the county bought 5,000 more.

The problem was how to hand plant so many trees.

Dick Mudge, chairman of Trout Unlimited, contacted the U.S. Army Reserve's 98th Training Division, based in Jamestown, New York. Shortly after that, on a weekend drill, the reserve unit trooped off to Mill Creek to help some trout.

Under the command of Captain Robert Vandenburg, the men joined local volunteers in planting 13,000 willows. Students later planted the remaining 4,000. "In one weekend the Army planted the bulk of the willows," reported Larry Brown, SCS district conservationist. "It was fantastic."

Then again, in a way the Army reserve unit was simply doing its job, protecting U.S. soil—and coincidentally protecting U.S. trout.

Dams for trout

McMinn County, Tennessee, lies between the Great Smoky Mountains and the Tennessee River. Many streams in the county will support, if not spawn, trout. Trout Unlimited in McMinn County is determined to get trout into the streams and is fully prepared to restock potential streams every year.

Under the leadership of Dr. John Woods, chairman of the Biology Department at Tennessee Wesleyan College, Trout Unlimited launched an ambitious program to raise 4-inch brown trout to 12 inches and release them into local streams, where it is hoped they will grow to 18 inches.

The local chapter started by leasing an old trout farm. The farm's pools hold about 50,000 fish for stocking.

A survey was conducted in the 10-county area of the Southeast Tennessee Resource Conservation and Development Project to determine which streams within the project area could support trout. At the same time, SCS in McMinn County located about a dozen spring-fed farm ponds capable of supporting trout, and Trout Unlimited worked with the pond owners to stock these ponds.

Trout Unlimited's basic plan was to stock about 12 streams in McMinn county and then announce the stocking areas and streams to the public. But there were problems. Although generally the streams were deep and cold enough for trout, there were short "low-flow" periods that could cause massive fish kills. Fact is, as put by Howard Whitaker, the SCS district conservationist in McMinn County, "The water gets so low that the trouts' backs are visible above the water."

Low flows can be compensated, however, and one way is to build small dams. Water backs up behind the dams during low flows, and the trout survive there until the water level is back to normal.

Trout Unlimited started by tackling Little Sewee Creek. Using rocks and logs, work crews constructed six dams along the creek in July and August of 1972. Unfortunately, in October 1972 all six dams were washed away by a flood.

Not about to give up, Trout Unlimited rebuilt the dams. But the floods were persistent too. Five more floods set Trout Unlimited back where it started—with no protection at all against the low flows.

At that point, Trout Unlimited contacted SCS. A general plan for more sophisticated structures was prepared. Six dams are to be built on Little Sewee Creek, where the old log-and-rock dams washed out. Similar work on other streams is also envisioned.

Close cooperation between Trout Unlimited and the Southeast Tennessee RC&D Project is bound to continue, for Dr. Woods is now chairman of the RC&D wildlife and recreation committee.

Pool diggers

There's more than one way to deepen a stream. Conservationists in McMinn County use dams to forms ponds. Conservationists in Rensselaer County, New York, on the other hand, use log structures to dig out pools.

These "pool diggers" were developed by the New York State Department of Environmental Conservation. Logs jutting out diagonally from both sides of a stream channel deflect the entire streamflow up a slight ramp at the center of the channel. Cascading off the ramp, the stream forms a small waterfall. Within a matter of months, pressure from the waterfall carves out a cool pool where trout can stay during the hot summer days. In addition, a riffle area forms along the edges of the pool where the fish can feed at night and at dawn.

Pool diggers have been used for years in Rensselaer County, both by New York's DEC and by the Conservation Alliance, a federation of sportmen's clubs. As a result, streams such as Kinderhook Creek and the Little Hoosic River have been among the best trout streams in eastern New York.

Pool diggers have to be refurbished every 5 years or so, however, and those in Rensselaer County's streams had not been touched in 15 years. The Little Hoosic's structures had almost entirely vanished, and the pools had reverted to normal streambed.

In 1971, SCS offered to work with the Rensselaer County Soil and Water Conservation District and the Conservation Alliance to restore the Little Hoosic pool diggers.

Technically, what needed to be done to the Little Hoosic was clear enough to John Nigro, an SCS district conservationist: seven pool diggers had to be built, snags and debris had to be removed, and riprapping had to be installed. The real problem Nigro faced was one of logistics: how to obtain the necessary muscle, material, transportation, and equipment without spending nonexistent money.

Somehow, everything was coordinated: muscle came from the Neighborhood Youth Corps; on weekends, members of the Conservation Alliance pitched in. DEC designed the structures and ran construction checks. The town of Cherry Hill supplied tools, and the town of Berlin provided transportation. Landowners let the conservationists use their easements. The Berlin Highway Department offered a headquarters location, and the Conservation Alliance helped with supervision.

One of Nigro's biggest problems was getting a safe tool for the most dangerous part of the construction—pounding 6-foot concrete-reinforcing steel rods through the log deflectors into the streambeds. The Alleghany Ludlum Steel Corporation solved the problem by offering to design and build two special hand "pile drivers."

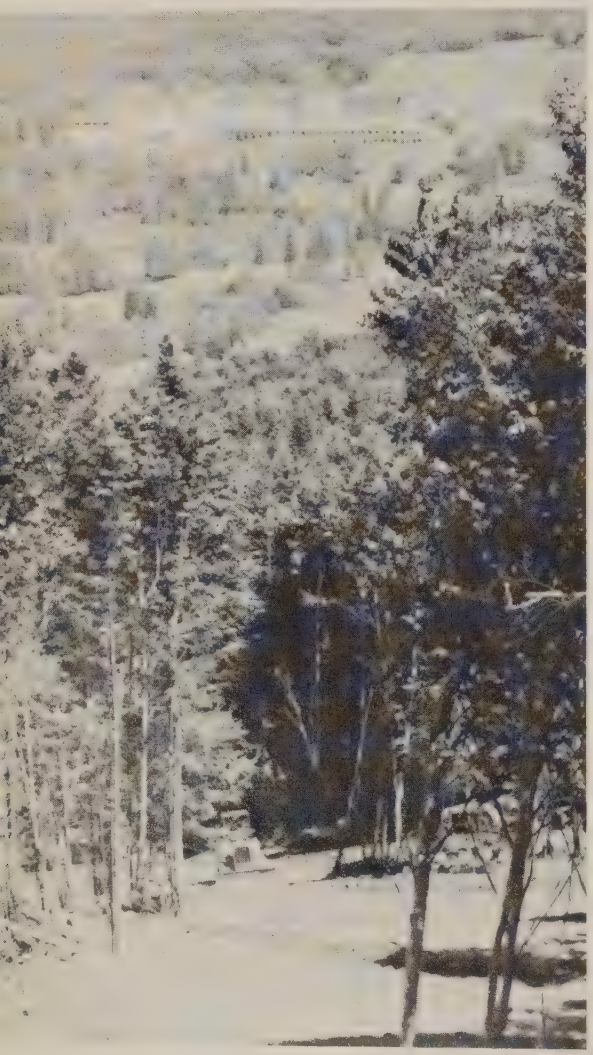
By the fall of 1971, 1,500 feet of the Little Hoosic had been improved for trout habitat. In the summer of 1972, SCS, DEC, and the Conservation Alliance joined a crew of Vietnam veterans working under the Emergency Employment Act to build 32 structures at various points along 7,000 feet of Kinderhook Creek. The team also built additional structures on the Little Hoosic.

The success of these programs encouraged the conservationists to continue the stream modification work in 1973. As for 1974, 1975, or 1976, the problem in Rensselaer County is still logistics. If they can crack the logistical difficulties, the New York sportsmen see this as a continuing program. So, there may be many more fish stories, fish trophies, and fish dinners to come. ♦

No scars on the landscape

by Calvin J. Perkins
District conservationist, SCS
Lancaster, New Hampshire

Two winters ago I was driving east on U.S. Route 302 near Carroll, New Hampshire, and saw trees on the steep slopes of Rosebrook Mountain being cut and large piles of brush being burned. Work had started on the area's new ski development.



A ski trail under construction. The Mount Washington Hotel is in the background.

My thoughts quickly turned to beautiful snow-covered Mount Washington to my left and the ice-laden Ammonoosuc River that flows peacefully along the base of Rosebrook Mountain to my right. Was this to be a haphazard development that would interrupt the picturesque views of the White Mountains and contaminate the clean water of this mountain stream?

No. It wasn't. Early into those winter months a representative of the Mount Washington Development Company contacted leaders of the North County Resource Conservation and Development Project. He was looking for technical assistance in planning and applying conservation practices in the ski development area to reduce erosion and sediment and protect the natural environment.

That contact resulted in a meeting of SCS people with planners, engineers, contractors, and others associated with the new ski complex. And it was the beginning of a successful effort to incorporate conservation concepts into the ski development.

The Soil Conservation Service, through the Coos County and Grafton County Conservation Districts, provided soil survey data on 2,500 acres. Soil data are basic to planning, and these data were used in planning the ski development, including 100 acres of cleared ski trails and sites for lift lines, underground snowmaking equipment, maintenance buildings, a lodge, condominiums, access roads, parking lots, and other related facilities.

The soil information included interpretative maps depicting various land use limitations.

Construction was halted late in winter because of the heavy snow accumulation. Fortunately, snowmelt the next spring did not cause excessive erosion. As soon as the land was dry enough for construction activity, the work was renewed.

SCS suggested improved methods of erosion control during construction. These were quickly adopted. They included two large sediment basins at the base of the mountain to settle out loose sediment and prevent it from entering the Ammonoosuc River. All of the small streams and suface water channels within the construction area were directed into two major drainageways that flowed into and through these sediment basins.

Culverts up to 6 feet in diameter were used to conduct water safely under access roads and across critical points on the ski slopes. Each culvert had stone headwalls at each end to prevent erosion and to provide a rustic appearance in keeping with the setting.

Temporary diversions were roughed in across the ski slopes after stumps and boulders were removed and were kept free of debris at all times. These were spaced about 50 feet apart on slopes greater than 35 percent and not more than 200 feet apart on slopes of less than 35 percent.

These diversions broke long slopes into short ones, reduced the potential for erosion, and took

the excess water off the area in an orderly manner.

During the final grading, which began at the top of the slopes, workers seeded, fertilized, and mulched as they moved downslope, never leaving more than 500 feet without proper cover or exposed to erosion.

Permanent diversions were installed where necessary on a grade of 1 percent or less. Each of these diversions was constructed to outlet into wooded space between trails and lift lines where a natural surface water channel carried the water safely downhill without erosion and into the sediment basins.

As access roads were constructed, surface-water ditches were also constructed; all cut and fill slopes were seeded and mulched immediately after construction.

With all of this construction activity, one could almost visualize a scarred landscape. But there is none. Engineers designed the ski trails so that they are not visible from the highway from either direction of approach until the viewer is directly opposite the ski development.

The Mount Washington Development Company has demonstrated that when conservation practices are included in development plans, the adverse effects on the area and its environment are minimal.

The White Mountains have retained their magnificent splendor, and the Ammonoosuc River continues along its path unaware of man's activity nearby. ♦



One of the sediment basins (above) built to prevent sediment from entering the Ammonoosuc River. A ski trail (below) immediately after it was seeded and mulched. (Photographs courtesy of Mount Washington Development Company.)



A timely takeoff with RC&D

by Neal C. Beery
District conservationist, SCS
Woodsfield, Ohio

Construction of the long-awaited Monroe County Airport near Woodsfield, Ohio, was well underway. But there was trouble.

Increasingly, severe soil erosion halted construction—and dimmed the optimism for economic expansion that had grown with the new facility.

The airport, built in a rough rolling area, developed erosion problems almost as soon as construction began. They increased as construction progressed and as more and more of the area was paved.

"We were aware that the landfill areas were eroding rapidly and that part of our drainage system had already washed away. The runways were in real danger of being undermined," said Vincent Ballard, attorney for the Monroe County Airport Authority. "And silt moving into a nearby stream was also a problem."

The Monroe County Airport Authority, appointed by the county commissioners, requested help in halting the damaging erosion from the Monroe Soil and Water Conservation District. Working through the district, the Soil Conservation Service helped the airport authority to develop an action plan. The plan included measures to control runoff water and establish grass on bare, sediment-producing areas. Along with the seeding suggestions, SCS prepared the necessary structural designs for the project.

"The services provided by SCS came at a critical time," said Ballard. "The airport authority had no funds to hire a consultant to determine what needed to be done."

The airport authority had asked sponsors of the five-county Buckeye Hills Resource Conservation and Development (RC&D) Project for financial assistance. It got $10,000 in RC&D financial assistance and much needed technical help.

Preliminary work to prepare the 28 acres of bare, eroding land for revegetation required more than an equal amount of money from the airport authority. This work included grading, removing rocks, and installing large mechanical structures, surface drains, and diversions to carry the runoff to protected outlets.

The labor force and much of the equipment were provided by the Monroe County Engineering Department; some heavy equipment had to be rented.

With grading and other construction work completed, the final step was to reseed the disturbed land. This work was contracted. Lime, fertilizer, and grass seed were spewed from a firehoselike nozzle on a slow-moving tank truck. Then mulch was applied, also by machine.

That eroding and badly gullied land is now well covered by tall fescue and crownvetch. "The excellent stand of grass has made the problem areas safe from water damage and has added beauty to the entire airport," said Clifford Ring, former county commissioner and a member of the airport authority. The new grass cover not only protects the land but also has resulted in an estimated annual savings of $1,818 in maintenance costs for Monroe County.

The airport authority has completed the planning and application of conservation practices on most of the 105 acres of land it controls. Now it is moving ahead with other improvement programs. Two new hangers have been built—one by the airport authority and one by an industrial concern—and another is in the planning stage. A modern administration building is the latest addition. It houses the operations center, weather station, and lighting and air-ground radio communications equipment.

Future plans include extending the present 3,800-foot paved runway to 5,000 feet.

"Many agencies and individuals worked closely with SCS on the project that helped to control erosion, reduce stream pollution, and improve the appearance of the area," said Thurman Christman, chairman of the Board of Commissioners of Monroe County. Our airport is now an important factor in the growth and development of our county. ♦



Sediment that washed from cut and fill areas near the runways was a hazard, and severe erosion threatened the entire airport facility.



Grading, a good cover of tall fescue and crownvetch, and other water control measures provided the needed protection and stabilization.

Tree farming is good business

by Benny Dobson
District conservationist, SCS
Oak Grove, Louisiana

Small timber tracts, when properly managed, can still make money. A. O. "Jack" Warm, a farmer in East Feliciana Parish, Louisiana, knows from experience that this is true.

"We have sold about $13,000 worth of timber from a 40-acre tract of woodland since 1956. We expect to do better on the cuts coming up because the quality and volume of the timber is better than it was 17 years ago. Also, young reproduction for future saw timber is now present."

In 1955, when the late P. A. Warm became interested in selling timber from the 40-acre tract, at least 70 little sawmills were operating throughout the parish. These mills came south from Mississippi as the timber supply to the north played out. They were portable and were set up on the timber tract being harvested. Timber was usually cut to an 8-inch stump. Quite often a woodland tract became a wasteland of stumps, briers, and brush. Nearly always the small woodland owner lost interest in his woodland because that source of income was lost for a long time.

In the early days the little sawmill operators paid as little as 50 cents per thousand board feet.



Years of good woodland management on this tract have increased timber yield and encouraged growth of wildlife food and cover.

Later, as timber became more scarce and competition increased and owners wised up, the price increased to as high as $40 per thousand board feet. It wasn't unusual for a woodland tract cut to an 8-inch stump to produce 15,000 to 20,000 feet of lumber per acre.

The Doyle scale was commonly used by the large mills to determine the volume cut, but it meant nothing to the small mill operators. They used the "lumber scale," which is the actual volume of lumber manufactured. Most small operators logged with horses and wagons. They even loaded wagons by hand when working with small trees. Two-by-fours of that day could be seen coming out of a mill with bark on all four edges.

"There was some good timber in East Feliciana Parish," said Jack Warm. "We had some excellent pine timber, especially on the 40 acres for which we've kept records. Dad asked the Feliciana Soil and Water Conservation District and the Soil Conservation Service for help in managing that tract when offers for his timber reached $2,000. He wanted to sell some timber but didn't want to destroy it."

A soils map of the tract, made earlier by SCS, showed that the timber was on Providence and Lexington silt loam. Woodland interpretations for these soils indicated that the trees could grow to a height of 90 to 100 feet in 50 years.

The stand of trees was about 37 years old at the time and had a sprinkling of virgin pine seed trees. There was an average of 150 merchantable trees per acre. As the dominant trees were already emerging, the real need was to thin from underneath—sort of a salvage operation.

SCS advised the senior Warm to select the smaller and defective trees for harvest and to leave the dominant and codominant trees for further growth. There was no young pine reproduction. The heavy canopy restricting the sunlight had made it impossible for young pine to come in. There wasn't any food for wildlife underneath the trees either.

Warm marked the trees selected for harvest with a long-handled paint brush. He made a paint mark at breast height and another at ground level. All marks faced the west so cutters would have no difficulty finding the trees to be cut.

Warm made a tally as he selected trees for cutting. It showed an average of 60 marked trees per acre, amounting to 5,000 board feet (lumber scale) of timber. With these figures he had the necessary information to bargain in making a sale. Or if he decided to ask for bids he would have a better idea as to what offers to accept or reject.

The marked trees on the 40 acres sold for $7,000—$175 per acre—and were cut in the winter of 1955-56.

When P. A. Warm died, five of his six children were living on the family farm. A blacktopped highway divided the farm, so the heirs had no problem dividing the property to give each equal highway frontage. But the 40-acre woodland tract presented a problem. The heirs decided to practice good woodland management on the tract for the next 20 years. The proceeds from periodic timber sales were to be divided equally.

Each of the heirs is an active conservationist and a cooperator with the Feliciana Soil and Water Conservation District. In 1964 the district assisted them in selecting trees for a pole and piling cut. An average of six sticks of piling per acre, at least 50 feet in length, were marked for sale. This sale resulted in an additional $100 per acre return.

Taking into account the salvage operations following hurricanes Hilda and Betsy, this 40-acre tract has yielded an annual return of more than $20 per acre for the past 17 years.

Openings in the stand can now be made because young reproduction is present. These openings have encouraged growth of wildlife food and cover.

The Warm family thinks that small woodland tree farming pays —in more ways than money. ♦

Don't forget esthetic values

by Philip R. Weatherman
Soil conservationist, SCS
Indianapolis, Indiana

Assisting *all* land users is a pledge that takes the urban conservationist on some unusual assignments—to a cemetery, for example.

The Floral Park Cemetery Association, which operates three cemeteries in Indianapolis, wanted to expand a waterfront mausoleum community at its Washington Park North Cemetery. The space for expansion was there, but because of the topography expensive outside fill material was needed to make the area suitable for construction. And cemetery officials feared that the esthetic value of their 2-acre lake would be diminished by the construction.



Even cemeteries have conservation problems. SCS assisted in an expansion project of this mausoleum complex in Indianapolis.

Association officials and their architects worked with the Soil Conservation Service and the Marion County Soil and Water Conservation District in preparing a conservation plan for the 80-acre cemetery.

A second small lake was excavated next to where the new buildings were to go up. This provided fill for the buildings and added to the esthetic value of the development. A soil map of the area showed that the soils were suited for lake construction and for use as fill material.

A 50-foot-long open channel was designed to connect the two lakes and provide runoff control. As often happens in urban conservation planning, just planning a workable practice is not enough. This channel, for example, had to be more than just workable. The cemetery officials wanted it alined with the street so people could view the main mausoleum over an expanse of uninterrupted water. The channel also had to be limited in width so it could be spanned by a footbridge, and the water had to be deep enough to conceal the bottom of the channel.

During construction, bare banks were sodded almost immediately after final grading. Other disturbed areas were seeded to ryegrass—not just once, but twice! A flock of 50 Canadian geese, year-round residents of the lake, ate the first grass seed almost as fast as it came from the seeder. The second attempt was completed successfully. With young boys as geese herders, the hungry honkers were held off until the seed could be properly covered.

After construction, a jetspray fountain was installed in the center of the new lake.

As with this cemetery, many developers and landowners are concerned with more than just solving soil and water problems. The solutions must often be designed into the total scheme of the development. Soil and water conservation measures should add beauty and esthetic qualities and not detract from the overall effect of a development. ♦

Review

Books

The Use of Land: A Citizens' Policy Guide to Urban Growth. Edited by William K. Reilly. *1973. Thomas Y. Crowell Co., New York, N.Y. 10019. 318 pp., illus. $3.95.*

This book presents a clear forceful argument for improving the way we develop our land for urban purposes. It was prepared by a 12-person committee with broad representation from the fields of education, state and local governments, banking, law, housing, and citizens' organizations. The work was sponsored by The Rockefeller Brothers Fund, which obviously provided sufficent financial support for a first-rate writing and research staff.

The book is not meant just for professional planners or other land use specialists. As its title indicates, it is written for the concerned citizen who wants a better understanding of the forces at work that make better land development so difficult to achieve.

The problems faced in guiding urban development are described accurately and candidly. And after discussing the obstacles to improvement, the book offers some very specific recommendations on what can and should be done in the way of (1) educating citizens to dispel old and outmoded concepts of land development; (2) setting up new institutions, both public and private, which contribute to better land development; (3) changes in state and local laws governing land use; and (4) new federal legislation to encourage state governments toward more positive action in land use guidance.

The book has a strong environmentalist viewpoint. It attacks the wastefulness of our present urban land use patterns, which use up too much land in uneconomic sprawl. It attacks the unethical practices of companies selling "second home" subdivisions that exploit rural lands at the expense of naive city dwellers and create natural resource problems virtually impossible to solve.

The book is equally strong in its viewpoint on housing needs of low-income families. It attacks the selfish practices of local governments that zone their land on the basis of admitting only the most affluent homeowner or the business or industry that pays high taxes and produces few problems.

The book concludes with a strong plea for civic organizations to provide leadership in their community in deciding on what should be protected and preserved, on what development needs should be met and how and when.

Many of the book's recommendations will be controversial—new legal concepts are proposed, new political responsibilities are demanded. Many lawyers and politicians will resist these efforts to rock the boat, but the boat is already being rocked.

Meetings

January

14–17 North American Game Breeders and Shooting Preserve Association, Inc., Sacramento, Calif.
16–17 National Council of Farmer Cooperatives, Washington, D.C.
17–19 American Farm Bureau Federation, Atlantic City, N.J.
18–23 American National Cattlemen's Association, San Diego, Calif.
20–24 National Association of Home Builders, Houston, Texas
23–26 National Woolgrowers Association, San Diego, Calif.
31–Feb. 2 Sixth Annual Catfish Farmers of American Convention and Trade Show, Memphis, Tenn.

February

2–3 Society for Range Management, Tucson, Arizona
10–14 National Association of Conservation Districts, Houston, Texas
20–22 Land Improvement Contractors of America, Williamsburg, Va.
20–23 American Camping Association, Atlanta, Georgia
21–22 Southern Forest Institute, Atlanta, Georgia
25–Mar. 2 American Association for the Advancement of Science, San Francisco, Calif.

March

8–14 Associated General Contractors of America, San Diego, Calif.
9–13 Association for Supervision and Curriculum Development, Anaheim, Calif.
10–14 National Farmers Union, Milwaukee, Wisc.
10–15 American Society of Photogrammetry, Washington, D.C.
15–19 American Seed Trade Association, Chicago, Ill.
17–22 American Concrete Pipe Association Technical Conference, San Francisco, Calif.
26–28 Agricultural Research Service Water Harvesting Symposium, Phoenix, Arizona
29–30 National Wildlife Federation, Denver, Colo.
31–Apr. 3 North American Wildlife and Natural Resources Conference, Denver, Colo.

GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D. C. 20401

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300
AGR 101

U.S.MAIL

POSTAGE AND FEES PAID
U. S. GOVERNMENT PRINTING OFFICE

MOVING? Send present mailing label and new address, including zip code, to Division of Public Documents, U.S. Government Printing Office, Washington, D.C. 20401.

Reading this book will help you to better understand who is rocking the boat and why. —Warren T. Zitzmann, *urban planning specialist, SCS, Washington, D.C.*

New publications

Composted Municipal Refuse as a Soil Amendment. *1973. University of Florida (Gainesville). 67 pp. $3.50.* Evaluates processed residential refuse as a source of plant nutrients and as a soil amendment.

Problems and Opportunities in Management of Combustible Solid Wastes. *1973. International Research and Technology Corporation (Washington, D.C.). 517 pp. $9.75.* A report on the costs, environmental impact, markets, use of federal procurement, and other incentives or disincentives to encourage resource recovery.

Resource Recovery from Raw Urban Refuse. *1973. Bureau of Mines (Washington, D.C.). 33 pp. $3.75.* Describes a pilot plant operation to recycle and reclaim municipal refuse.

The annual domestic subscription price of SOIL CONSERVATION has been raised to $5.65, effective with this issue. The single copy price is now $0.50. The foreign subscription price is $7.10 per year.

Soil surveys

Georgia

Cherokee, Gilmer, and Pickens Counties. By Dan H. Jordan, Glenn L. Bramlett, Gene A. Gaither, Ray J. Tate, Marion M. Blevins, and James O. Murphy. *1973. Soil Conservation Service and Forest Service in cooperation with the University of Georgia, College of Agriculture, Agricultural Experiment Stations. 73 pp., illus.; maps.*

Kansas

Edwards County. By William E. Roth. *1973. Soil Conservation Service in cooperation with the Kansas Agricultural Experiment Station. 64 pp., illus.; maps.*

Louisiana

St. James and St. John The Baptist Parishes. By Warren L. Cockerham, Ray E. Dance, Almond G. White, and Bradley E. Spicer. *1973. Soil Conservation Service in cooperation with the Louisiana Agricultural Experiment Station. 46 pp., illus.; maps.*

Oregon

Alsea Area. By John F. Corliss. *1973. Soil Conservation Service and Forest Service, and U.S. Department of the Interior, Bureau of Land Management, in cooperation with the Oregon Board of Natural Resources and the Oregon Agricultural Experiment Station. 82 pp., illus.; maps.*

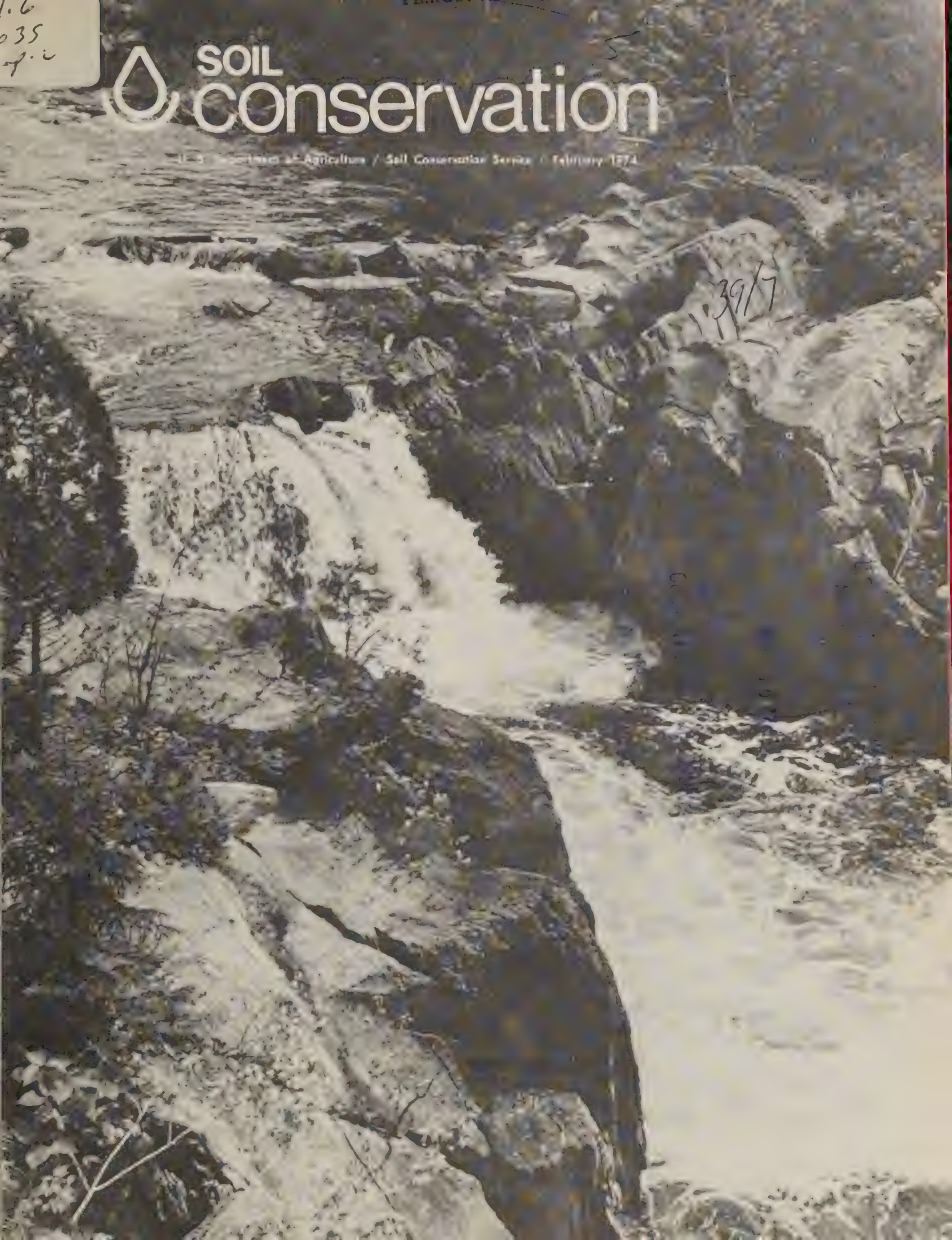
Texas

Scurry County. By Marvin L. Dixon, William H. Dittemore, Jr., and Harold W. Hyde. *1973. Soil Conservation Service in cooperation with Texas Agricultural Experiment Station. 56 pp., illus.; maps.*

1.6
035
7.2

SOIL conservation

U.S. Department of Agriculture / Soil Conservation Service / February 1974



3917

Education — a lifetime job

I recently attended a short course on the environment at the University of Georgia. The course provided a very helpful exchange of views between SCS people and the scientific community on environmental issues, ecology, law, land use planning, stream channel modification, and methods of environmental assessment.

This course and similar ones elsewhere are of great value to SCS people, especially those in policy-making positions. They illustrate something I believe in very strongly—the importance to all of us of continuous educational experiences.

As conservationists we are in the business of helping to make this country a better place in which to live. To do this we must keep up with significant changes and developments in both our own professional disciplines and in the larger national life. The energy shortage, possible food shortages or dislocations, the many conflicting pressures for different uses of our land and water—all of these national concerns have a major effect on the work of the Soil Conservation Service. To meet and successfully grapple with these challenges we must strengthen our skills and gain new insights into our changing society.

Present and future conservationists in SCS must receive the kind of training that will enable them to work effectively with the many private, commercial, and governmental groups interested in the environment. All of us will need to reach far beyond our own professional fields to try and understand those major forces that affect our nation and hence our own effectiveness to the nation.

The intensive short courses some of you have been attending are one form of timely training. The full-time or part-time classroom study that almost 300 SCS people are now undergoing—the great majority on their own time and at their own expense—are a very significant type of education. And, of course, reading and study on one's own initiative, participation in business and professional societies, and on-the-job training are other methods of stretching the mind and improving one's abilities.

The Soil Conservation Service owns no large buildings, no big tracts of land, nor warehouses full of equipment. Our strong suit has always been our skilled, trained people. And our effectiveness—yours, mine, the SCS man or woman in Bangor, Boise, Anchorage, Albuquerque, and points in between—is only as good as our abilities and training.

Any "graduation" from formal education should be considered a base on which to build, rather than a terminal point in which to store our intellectual curiosity. Continuous education of some sort must always be a major part of SCS thinking and experience.

Kenneth E. Grant

SOIL conservation

February 1974, Vol. 39, No. 7

Contents

2 From the Administrator

4 In a Year's Time
Summary of activities of the Soil Conservation Service

14 One plus one—double cropping grows in the Corn Belt
by Roy E. Hamilton

16 Maine's way of maintaining her natural areas
by Robert Wengrzynek and Herbert Hartman

18 Woody plants for Maryland highways
by H. W. Everett, John A. Dickerson, and J. H. Kimmons

20 Conservation in action

22 Recon

23 Review

23 Meetings

COVER: Natural areas like this one in Maine are disappearing fast. Maine's natural areas have been inventoried, and a plan to protect them is being developed. See article on page 16. (Photo courtesy of Robert Cummings, *Portland Press Herald*, Portland, Maine.)

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

EARL L. BUTZ, Secretary of Agriculture.

KENNETH E. GRANT, Administrator, Soil Conservation Service

PHILLIP A. CHAVEZ, Editor

MARYELLEN BERTRAM, Editorial Assistant

SOIL CONSERVATION, the official magazine of the Soil Conservation Service, is published monthly by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. Use of funds for printing this publication approved by the Director of the Office of Management and Budget, July 17, 1973.

Reprint permission: Contents of this magazine may be reprinted without permission. Credit is not required but is appreciated. Photographs are available on request.

Commercial names: Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscription: $5.65 per year, $7.10 foreign. Single copy, 50 cents. Discount of 25 percent on orders of 100 or more sent to same address. Order direct from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

In a Year's Time

Summary of activities of the Soil Conservation Service for fiscal year 1973

In a year's time, the Soil Conservation Service provided 2.7 million technical services for 1.1 million individual land owners and users; helped prepare more than 71,700 conservation plans covering 26 million acres; provided more than 123,000 technical services for 30,433 local and state governments and their agencies; helped improve nearly 10 million acres of land and water for the specific benefit of wildlife; helped prevent $46 million in flood damages through watershed projects . . .

The Soil Conservation Service provides basic resource data and technical assistance for a wide range of community and regional activities aimed at accelerating conservation of soil and water, stimulating economic development, increasing job opportunities, guiding land use changes, improving the quality of rural and urban environments, increasing outdoor recreation facilities, and assisting with other efforts to provide a better life for people.

These services are in addition to the continuing assistance that SCS gives to individual land owners and users in solving their soil and water conservation problems.

SCS's traditional technical assistance to individual land owners, to local conservation districts, to sponsors of watershed projects and resource conservation and development projects, to participants in the Great Plains Conservation Program, and to other organized conservation programs becomes more important as the complexity of conservation, land use, and environmental problems increases.

Resource conservation assistance

In the 38 years that the Soil Conservation Service has been assisting decision makers with their soil and water problems, an interest in better land use and in erosion and sediment control has spread to all segments of our society. Today not only do farmers actively take part in conservation district activities but so do people from all walks of life. We find a diversity of individuals represented in district leadership roles.

Help through conservation districts

During fiscal year 1973, the Soil Conservation Service continued its planning assistance to individual land owners and users and groups that are cooperators with the 2,962 conservation districts throughout the country.

SCS people helped prepare 71,765 conservation plans covering 26.3 million acres and helped revise more than 31,000 plans covering 19.1 million acres. More than 602 million acres of nonfederal land in the United States now are covered by conservation plans that help to insure resource protection and proper land use.

Conservation districts, by the

end of the fiscal year, had 2.2 million cooperators who were applying and maintaining soil and water conservation practices on 778.1 million acres.

SCS recognizes that conservation measures must be carefully planned, installed, and maintained. It provides onsite technical assistance for applying land treatment measures as needed to insure quality control and to implement new techniques. In fiscal year 1973, SCS provided 2.7 million technical services to 1.1 million individual land owners and users in conservation districts.

SCS environmental improvement work for wildlife was impressive in fiscal year 1973. SCS specialists helped land owners across the country improve approximately 9.6 million acres of land and water for the specific benefit of wildlife—a 27 percent increase over 1972. In addition, stripcropping, range improvement, pond building (43,056 in 1973), and other wildlife-benefiting practices were put on millions of acres of land.

More than half a million acres of land were converted to combined wildlife and recreation use in 1973, bringing the total to date to about 12 million acres.

Because of increasing demands for pollution abatement and resource protection, more contractors in the construction of structural measures are seeking assistance from SCS. SCS, Land Improvement Contractors of America, and Farm and Industrial Equipment Institute have teamed up to provide training sessions for contractors. Four training sessions were held in 1973.

Conservation help for units of government

SCS has provided many local and state governments with natural resource information and guided them in its use to prepare plans and programs for making their communities, villages, towns, counties, and states a better place in which to live and work.

In response to public demand for a planned approach to solving land use and environmental problems, many local governments have enacted ordinances that require conservation principles to be incorporated into land development plans. Such plans take into account the suitabilities and hazards inherent in soils.

In fiscal year 1973, SCS provided more than 123,000 technical services to 30,433 local and state governments and their agencies. About 710 local ordinances concerned with land use and erosion and sediment control were put into effect by local governments—an increase of 35 percent over 1972.

Approximately 16,900 natural resource inventories and evaluations were prepared with SCS help. With such information, local units of government can develop quality standards for conservation land use and treatment.

In providing resource information about soil limitations and other site hazards, SCS helped units of government to select more than 2,100 sites for public facilities such as schools, parks,

and hospitals. These facilities contribute much to enriching the quality of life in many communities across America.

Thirty-three states have either held or are planning erosion and sediment control institutes. These provide state leadership with a base on which to develop erosion and sediment control legislation. To date, eight states and the Virgin Islands have enacted such laws and eight others have introduced legislation. SCS provided resource facts that helped the states in formulating this important legislation.

Requests for assistance to the Environmental Protection Agency jumped drastically, which reflects that agency's increasing understanding of SCS's experience in many fields—feedlots, strip mining, construction, solid waste disposal. Requests for the development and review of standards, limitations, regulations, and guidelines were numerous and required an appreciable amount of SCS time.

Watershed protection and flood prevention

During fiscal year 1973, 18 multipurpose dams, 141 floodwater retarding dams, and many other structural as well as nonstructural water management and sediment control measures and practices were installed in Public Law 566 watershed project areas. An additional 40 floodwater retarding dams were constructed during the year in the areas covered by the 11 flood prevention projects which were authorized by an earlier act. All watershed projects include soil conservation measures and land treatment practices for the area.

Some of the older projects were modified to eliminate more than 550 miles of planned channel work and to add ponds, marshes, and other wildlife areas.

Environmental impact statements have been or are being prepared for 85 watershed projects. The process of making careful environmental assessments highlighting the balance between social and economic benefits and environmental values has been strengthened.

In setting up watershed projects, special consideration is given to alternatives that eliminate or greatly reduce anticipated adverse environmental impacts. The use of soil conservation practices plus nonstructural flood plain management measures by themselves or in combination with structural measures is being emphasized. The stress placed on environmental quality and the consideration of alternatives are time consuming but have resulted in better and more comprehensive plans.

During fiscal year 1973, federal assistance in planning or installing soil and water conservation measures was furnished to sponsors of 1,010 watershed projects. Initial agreements for construction were signed for 33 projects in 18 states. In 386 projects, the construction of all engineering measures had been completed by the end of the fiscal year, and in 356 of these projects all planned construction and related land treatment work had been completed.

Twenty-eight applications for watershed assistance were submitted during the fiscal year. To date, planning assistance has been authorized for 1,676 watershed projects.

Emergency watershed protection. In 1973 heavy rains occurred over much of the Mississippi basin in the spring and in the Northeast in June. Congress approved a $20 million supplemental appropriation on July 1, 1973, for emergency measures to protect lives and property from flooding and the effects of flooding, erosion, or sediment. The Soil Conservation Service moved rapidly, working through state and local organizations, to help open clogged watercourses, vegetate critically eroded areas, repair dikes, and install other conservation and protection measures.

By the end of fiscal year 1973, work rectifying damage by Hurricane Agnes was well advanced. Some of the progress is shown below:

Critical area planting	2,062 acres
Dike and levee restoration	300 feet
Spillway restoration	27
Channel debris removal	105 miles
Channel restoration	205 miles
Streambank protection	172 miles

River basin planning. SCS activities in river basin surveys increased in some areas and leveled off or decreased in others.

Fifty-six cooperative studies are in progress in 44 states. Ten of these were initiated in fiscal year 1973.

Environmental information is becoming a greater part of cooperative studies, not only to comply with the National Environmental Policy Act of 1969 and the new Principles and Standards for Planning but also to provide the significant environmental data and perspective necessary for the more detailed levels of planning.

States find cooperative studies useful for meeting their specific objectives in water and land resources planning. For example, a study in Massachusetts is helping to identify valuable reservoir sites.

In Iowa, the Legislature recently divided the state into six conservancy districts, one of which, the Iowa-Cedar Conservancy District, is sponsoring a cooperative study in the Iowa-Cedar

Estimates of benefits gained in 1973 and since the Public Law 566 watershed protection and flood prevention program began.

	1973	Total
Flood damages prevented	$46 million	$317 million
Tons of sediment trapped	1.9 million	18.4 million
Benefits from erosion control and grassland improvement	$67 million	$414 million
Man-years employment from construction	2,830	25,500
Jobs created in new and expanded businesses	6,500	76,000
Reservoirs for municipal and industrial water supply	2	77[1]
Reservoirs with recreation facilities	4[2]	106[3]

[1] Serving 367,000 people in 78 towns.
[2] Providing 31,000 user days per year.
[3] Providing more than 6 million user days per year.

Rivers Basin. The state has requested similar resource studies in each of the other five districts.

In Tennessee, the Governor requested the Obion-Forked Deer Rivers Basin Study, which focuses on a flood plain area where there is controversy over resource use and development.

And in West Virginia, SCS and the U.S. Army Corps of Engineers are jointly studying the Pocatalico River Basin in response to a U.S. Senate Public Works Committee resolution for a plan to meet critical water supply shortages in several rural communities. A joint interim report has been prepared and submitted for Congressional authorization and implementation.

One comprehensive framework study, the Lower Mississipi Regional Study, is currently underway and is scheduled for completion in fiscal year 1974. Eight comprehensive detailed studies are in progress. Two of these, the Hawaii and Connecticut supplemental studies, were initiated in fiscal year 1973, and one, the Red River of the North study in North Dakota and Minnesota, was completed.

Flood hazard studies. The nationwide interest in flood plain regulation and land use planning is creating more and more demand for SCS assistance in flood hazard analyses. In fiscal year 1973, five more states began participating in the flood hazard analyses program, and seven studies were completed. At the end of the year, 23 states were participating and 66 studies were underway.

Flood hazard reports have been published on 13 of the studies. These reports are being used by local communities, counties, and the states as a basis for land use planning and for regulating the use and development of flood plains.

Flood insurance studies. SCS undertook three special tasks for the Department of Housing and Urban Development late in the fiscal year: (1) a type 21 study —listing all flood- or mudslide-prone communities in each state; (2) a type 22 study—acquiring maps of the flood- or mudslide-prone communities in each state (more than 13,500 communities were found to be flood-prone, and a small number of these were also subject to mudslides); and (3) type 7 studies—delineating flood-prone areas on U.S. Geological Survey quadrangle sheets, based on a 100-year flood, using only experienced judgment, soil surveys, and other locally available information.

Total value of all reimbursable studies initiated for HUD in fiscal 1973 was more than $1.5 million. Since July 1969, SCS has been engaged in 155 detailed studies in 37 states and Puerto Rico. At the end of the fiscal year, 127 studies had been completed.

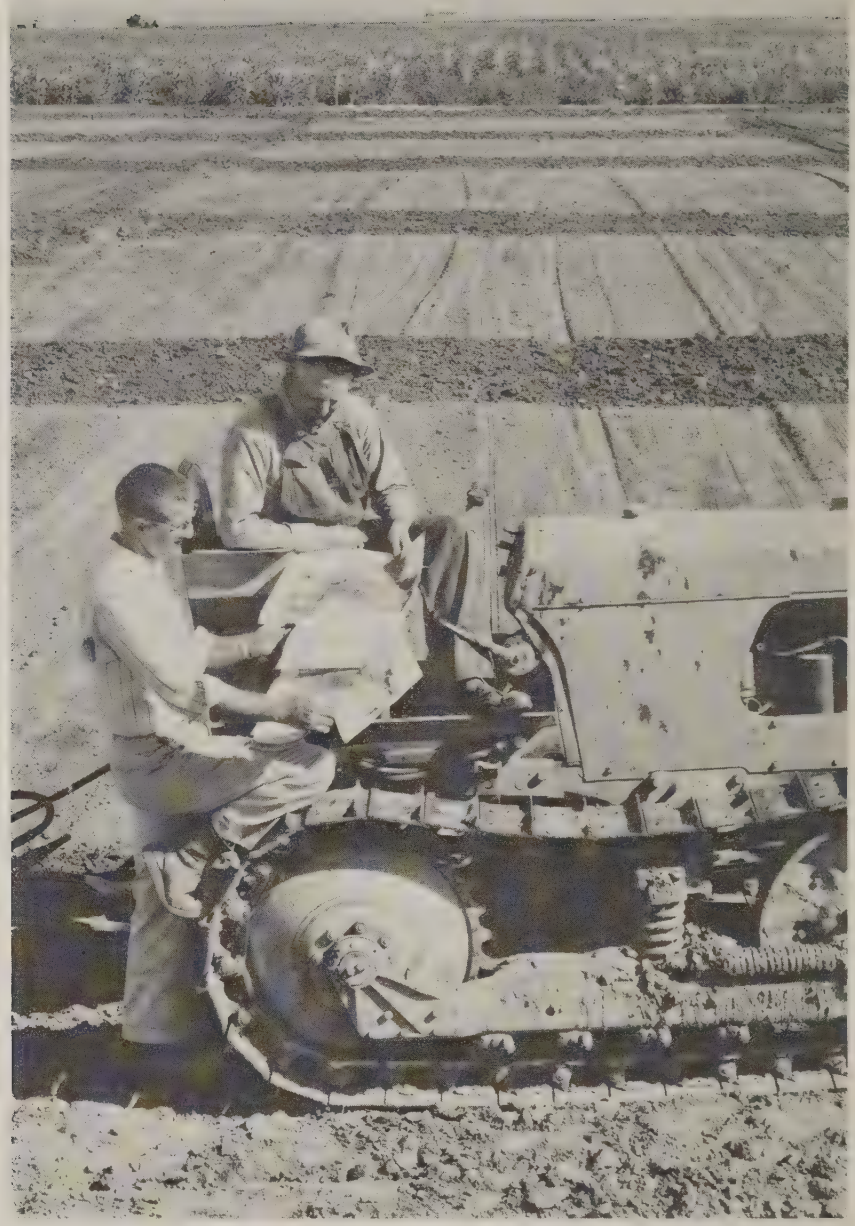
Resource conservation and development projects

During fiscal year 1973, 25 new resource conservation and development projects became eligible for assistance. The 25 new projects are in 26 states: Alabama, Arizona, California, Colorado, Indiana, Kansas, Kentucky, Maine, Michigan, Mississippi, Missouri, Montana, New Jersey, New York, North Carolina, North Dakota, Ohio, Oregon, South Carolina, Tennessee, Texas, Utah, Vermont, Virginia, Wisconsin, and Wyoming.

RC&D program assistance at the end of the fiscal year was being provided to 123 projects in 812 counties covering 521,442,000 acres. Nearly 2,100 units of government, including conservation districts, sponsor these projects. All states except Alaska participate in RC&D project activities.

These locally initiated and sponsored projects help to improve the use of an area's natural resources and the economic and social well-being of the people.

In 82 RC&D projects, the initial phases of planning have been completed, and operations have been authorized, enabling the sponsors to receive financial and



In 1973, SCS continued to help farmers and ranchers to increase agricultural production as needed while protecting and preserving the nation's soil and water resources.

technical assistance in carrying out their plans. Sponsors in 20 of the new projects have project plan developments well underway, and most will complete their plans by the end of fiscal year 1974.

In carrying out their RC&D project plans in fiscal year 1973, sponsors adopted 3,519 measures and completed 1,198. Community-type conservation measures completed with RC&D financial and technical assistance included those for erosion and sediment control, flood prevention, public water-based fish and wildlife and recreation developments, land drainage, farm irrigation, educational training, industrial development and expansion, and marketing improvements.

Great Plains Conservation Program

In fiscal year 1973, 2,565 farmers and ranchers signed Great Plains Conservation Program contracts to apply wind and water erosion control measures on 4.3 million acres. Under these contracts, about 21 percent of high-risk lands now used for tilled crops is planned for conversion to grassland.

At the end of the fiscal year, 7,200 unserviced applications for contracts were on file in the 469 counties eligible for participation in the Great Plains Conservation Program. This represents a backlog higher than in any year since program operations began in 1957.

More than 45,100 farmers and ranchers have now entered into long-term contracts covering 81.7 million acres. Of this number, 26,413 contracts have been successfully completed, 2,407 were terminated for various reasons, and 16,330 are still active.

Resource technology development

In fiscal year 1973, there was increased emphasis on providing SCS field personnel with updated knowledge in waste management systems. This included the role of plants, behavior of plant nutrients and pesticides, and management of plants in water management systems.

Work continued on the cause and control of accelerated soil erosion and sediment damage resulting in improved technical information that is applicable to many land uses.

SCS continued to help the nation's livestock producers to grow greater amounts of high-quality forage on native grazing lands to meet the challenge of increasing the number of livestock. Planned grazing systems were started on 6 million acres of rangeland in fiscal year 1973, raising to nearly 44 million acres the amount of grazing land under up-to-date grazing systems. Many reports of 50 to 100 percent increases in rangeland production, with corresponding improvement in erosion-resistant plant cover, indicate the effectiveness of grazing systems that are carefully tailored to individual ranching units.

More than 12 million acres of rangeland was improved by deferred grazing, and 420,000 acres of eroding land was seeded to rangeland plants in fiscal year 1973. Plant cover was improved on about 4 million acres on which invading brush was managed to restore plant community balance, increase sediment control and forage, and improve the quality of wildlife habitat.

As concern for the protection and improvement of natural resources continues to grow, it becomes increasingly important that structural measures — ponds, dams, disposal lagoons, floodwater retarding structures, diversion dikes, channels—be esthetically compatible with surrounding areas.

Incorporating landscape architectural principles in the design of these measures will help to minimize detrimental impacts and at the same time visually improve the areas. To assist in this aspect of design, a landscape architect was added to the staff of the Engineering Division in Washington. Two states also have landscape architects on their staffs.

Agricultural waste management

SCS specialists gave onsite assistance to landowners in the installation of 3,800 agricultural waste management systems during fiscal year 1973. The systems involved lagoons, holding ponds, or waste storage facilities in addition to many conventional soil and water conservation practices. Waste management system construction amounted to about $16 million or 3.1 percent of the cost of all practices installed with CO-O1 assistance. On the basis of the total CO-O1 work force, waste management assistance comprised about 4.2 percent of 390 man-years.

Requests for technical assistance in agricultural waste management are expected to increase rapidly during the next year. Demand already exceeds available manpower in many areas of the country.

Plant materials

The selection of improved plants for grassed waterways and field windbreaks, for use in converting marginal agricultural land to pasture or range, for use as cover crops, and for stabilizing critical areas continued to be an important activity.

Work increased in finding improved plant materials and techniques to solve conservation and environmental problems relative to: the stabilization and beautification of highway banks, recreation areas, housing and industrial developments, and other critical sediment sources; mine spoil reclamation; streambank or pond waterlines protection; sand dune stabilization; solid and liquid waste disposal; slow burning cover for dry brush lands; wildlife food and cover; and beautification.

The following new plants were released by SCS and cooperating agencies and state experiment stations during fiscal year 1973:

'Midwest' manchurian crabapple—for windbreaks, shelterbelts, roadside beautification, and wildlife food and

cover in the Midwestern States.

'Pink Lady' winterberry euonymus—for roadside stabilization and beautification, windbreaks, and wildlife habitat improvement in the southern Great Plains.

'Arriba' western wheatgrass —a variety adapted to the southern Great Plains.

'Redondo' Arizona fescue— for stabilizing ski slopes and other critical areas at high altitudes in the Rocky Mountains.

'Bandera' Rocky Mountain penstemon — a flowering forb for erosion control and beautification along highways.

Woodland. The estimated twofold increase in timber necessary by the year 2000 must be planned 25 years or more in advance. The challenge of "Tree Time USA," a project of the American Foresty Association, is to plant 40 million acres in trees in 10 years. The SCS goal is 5 million acres of trees by 1983.

In fiscal year 1973, district cooperators planted approximately 366,000 acres in trees. This was less than last year mainly because conditions during the planting season were unfavorable and planting stocks were low. All indications, however, point to an increase in fiscal year 1974.

Other accomplishments in 1973 in woodland conservation that will help increase wood crop production were 384,719 acres of woodland improvement and 1,515,762 acres of improved harvesting. The 2,376 miles of field windbreaks that were planted will help increase food production and the 42,418 acres of farmstead and feedlot windbreaks will add to the living comfort of both man and beast.

Surveying and monitoring

During the fiscal year, SCS continued to accelerate its surveying and monitoring work as other agencies and the public became better acquainted with the services that SCS provides.

Snow survey

In fiscal year 1973, 2,412 water supply forecasts were made at 465 locations along western mountain streams. The people living on more than 9 million acres of irrigated land benefited from these forecasts.

The current network for snow measurement and related data includes 1,600 mountain snow courses, 200 aerial markers, 200 soil moisture installations, and 300 mountain precipitation gages. A prototype system of automated sensing devices for data collection and transmittal via radio telemetry has been installed at about 40 sites. In fiscal year 1973, preliminary plans for converting approximately one-third of the manually measured sites to automated sites were completed for each of the 10 Western States.

An agreement was signed with the National Weather Service to permit use of the Geostationary Operational Environmental Satellite (GOES) as a radio relay station for three automated sites. The satellite is scheduled for launch early in 1974.

Soil survey

The Soil Conservation Service provides leadership for the national cooperative soil survey program, whose objective is to provide soil survey information on all of the soils of the United States and the Caribbean Area and to publish this information. A soil survey identifies, describes, classifies, and shows on maps the different kinds of soil. Soil characteristics observed in the field and obtained through laboratory examination of selected soil samples are recorded.

Soil information and interpretations serve as guides for land users in matching use to soil and in determining soil performance under alternative uses.

Soil surveys are made in cooperation with other federal agencies, state experiment stations and other state agencies, county governments, soil and water conservation districts, and other local organizations.

Soil survey operations. In fiscal year 1973, detailed soil survey mapping was completed on about 38.4 million acres; reconnaissance soil survey mapping was completed on about 8.5 million acres. In addition, exploratory soil survey mapping was completed on 63 million acres in Alaska.

The cumulative total for all soil survey mapping completed by the end of the fiscal year was about 1.2 billion acres, or 52 percent of the land in the United States and the Caribbean area.

Soil survey mapping has been completed on an estimated 72 percent of areas in the nation where housing and industry are rapidly expanding.

Soil survey interpretations. In fiscal year 1973, 90 soil survey manuscripts were sent to the Government Printing Office for publication. This is an alltime high. The manuscripts represent 46.9 million acres of mapped land.

Soil interpretations for more than 1,200 soil series from all parts of the country have been entered in computer storage at the Statistical Laboratory, Iowa State University. These data will

Summary of Progress, Fiscal Year 1973

Total reportable progress in soil and water conservation programs assisted by the Soil Conservation Service

Progress item		Fiscal year 1973	Cumulative to June 30, 1973
Conservation plans and related services			
District cooperators	No.	83,235	2,278,927
District cooperators	acres	30,061,970	778,093,166
Recipients of technical assistance	No.	1,127,110	—
Technical services	No.	2,761,088	—
Recipients applying practices	No.	661,431	—
Conservation plans prepared	No.	71,765	1,802,263
Conservation plans prepared	acres	26,382,668	602,814,642
Conservation plans revised	No.	31,015	—
Conservation plans revised	acres	19,154,880	—
Inventories and evaluations prepared	No.	86,728	—
Federal lands in coordinated conservation plans	acres	1,321,929	14,890,266
State and county CNI reports	No.	47	—
Resource planning and implementation			
Services for resource planning	No.	123,554	—
Land use and conservation treatment for units of government	No.	9,517	—
Units of government assisted	No.	30,433	—
Resource plans prepared	No.	1,264	—
Inventories and evaluations for resource plans	No.	16,907	—
Land use regulations established	No.	713	—
Sites for public facility, selected	No.	2,146	—
Sites for public facility, investigated	No.	12,144	—
Group plans, services, and installation plans			
Group conservation plans	No.	3,326	21,219
Group inventories and evaluations	No.	5,053	—
Groups assisted	No.	15,011	—
Services to groups	No.	73,291	—
Groups applying practices	No.	4,613	—
Great Plains Conservation Program			
GP applications received	No.	4,898	52,354
GP applications received	acres	7,510,973	98,289,677
GP contracts signed	No.	2,565	45,150
GP contracts signed	acres	4,332,466	81,681,801
GP contracts terminated	No.	2,981	28,820
GP contracts terminated	acres	4,936,001	48,464,337
Cropland before GP contract	acres	658,465	12,550,465
Planned cropland conversion	acres	169,896	2,651,184
Servicing other USDA programs			
Referrals serviced:			
REAP—Fiscal year	No.	210,735	—
REAP—Program year	No.	—	271,837
Cropland Adjustment Program	No.	29	—
Appalachian Program	No.	638	—
Conservation plans approved	No.	97	—
Water bank program			
Requests for agreement serviced	No.	2,832	—
Plans developed	No.	1,169	1,169
Plans developed	acres	638,941	638,941
Wetland treatment completed in water bank plans	acres	55,740	—

Progress item		Fiscal year 1973	Cumulative to June 30, 1973
Soil surveys			
Detailed soil surveys	acres	38,497,230	811,980,800
Reconnaissance soil surveys	acres	8,498,752	48,108,368
Total surveys	acres	46,995,982	860,089,168
Exploratory soil surveys	acres	63,000,000	337,516,000
Snow surveys and water supply forecasting			
Snow course measurements	No.	8,010	—
Aerial snow marker readings	No.	1,079	—
Mountain precipitation gage readings	No.	1,884	—
Soil moisture station readings	No.	1,250	—
River stations for which numerical forecasts issued	No.	1,038	—
Numerical forecasts issued	No.	2,412	—
River basin studies			
Flood hazard analyses	No.	5	—
Flood insurance studies	No.	32	—
Watershed and RC&D project measures			
Reservoir-type structure sites:			
Investigated	No.	428	—
Surveyed	No.	830	—
Reservoir-type structures:			
Designed	No.	803	—
Under construction	No.	1,237	—
Flow control structure sites:			
Investigated	miles	627	—
Surveyed	miles	717	—
Flow control structures:			
Designed	miles	784	—
Under construction	miles	1,198	—
Fish, wildlife, and recreation developments (public):			
Surveyed	No.	20	—
Designed	No.	17	—
Under construction	No.	32	—
Services provided on land rights, agreements, and contract awards	No.	25,356	—
Recreation developments			
Land owners and operators:			
Establishing first commercial enterprise	No.	1,569	70,024
Expanding or adding to recreation enterprises for primarily commercial use	No.	1,130	—
Changing to recreation enterprises as primary source of income	No.	132	14,193
Changing to recreation enterprises as primary source of income	acres	44,569	2,425,544
Establishing, expanding, or adding to recreation developments for primarily noncommercial use	No.	31,007	649,657
Establishing, expanding, or adding to public recreation developments	No.	570	46,103

Summary of Progress, Fiscal Year 1973—Continued

Total reportable progress in soil and water conservation programs assisted by the Soil Conservation Service

Practice		Fiscal year 1973	On the land—June 30, 1973
Bedding	acres	27,450	781,983
Brush control	acres	4,076,506	53,533,920
Burning, prescribed	acres	513,362	4,824,424
Chiseling and subsoiling	acres	695,103	9,043,648
Clearing and snagging	miles	491	7,667
Conservation cropping systems	acres	20,544,209	211,277,128
Contour farming	acres	3,051,248	49,934,937
Critical area planting	acres	157,014	5,073,365
Crop residue management	acres	19,785,547	177,110,223
Dams, diversion	No.	410	22,104
Dams, multiple-purpose	No.	226	7,332
Dams, multiple-purpose	acre-feet	26,689	20,790,669
Debris basins	No.	2,708	77,867
Deferred grazing	acres	12,324,705	84,809,166
Dikes	miles	330	11,990
Disposal lagoons	No.	1,324	5,644
Diversions	miles	2,081	100,752
Drainage field ditches	miles	4,563	189,264
Drainage mains or laterals	miles	5,106	379,751
Drains	miles	21,304	898,382
Farmstead and feedlot windbreaks	acres	42,418	800,487
Fencing	miles	5,545	576,646
Field borders	miles	1,117	46,039
Field windbreaks	miles	2,376	96,082
Firebreaks	miles	3,333	36,837
Fish stream improvement	feet	291,558	2,431,466
Fish ponds, commercial	acres	5,805	78,129
Fish raceways	feet	36,812	417,039
Fishpond management	No.	68,442	691,655
Floodwater diversions	feet	63,796	1,542,386
Floodwater retarding structures	No.	302	11,606
Floodwater retarding structures	acre-feet	182,174	6,126,281
Floodways	feet	38,561	4,346,221
Grade stabilization structures	No.	9,834	234,338
Grassed waterways or outlets	acres	94,787	2,079,785
Grazing land mechanical treatment	acres	17,676	1,415,216
Heavy use area protection	acres	3,295	174,225
Hedgerow planting	miles	385	23,966
Hillside ditches	miles	63	3,108
Holding ponds and tanks	No.	2,552	6,386
Irrigation canals or laterals	miles	209	58,167
Irrigation ditches and canal lining	miles	807	35,377
Irrigation field ditches	miles	1,328	133,268
Irrigation pipelines	miles	4,520	95,291
Irrigation pits or regulating reservoirs	No.	998	49,679
Irrigation storage reservoirs	No.	180	41,460
Irrigation storage reservoirs	acre-feet	36,215	8,342,001
Irrigation systems, sprinkler	No.	4,673	136,501
Irrigation systems, sprinkler	acres	412,026	8,773,972
Irrigation systems, surface and subsurface	No.	5,322	170,423
Irrigation systems, surface and subsurface	acres	559,148	16,481,315
Irrigation systems, tailwater recovery	No.	1,201	17,985
Irrigation water management	acres	3,362,801	22,313,923
Land grading, drainage	acres	44,791	569,586
Land leveling, irrigation	acres	241,035	11,899,150
Land smoothing	acres	184,321	7,591,329
Livestock exclusion	acres	739,562	29,483,423
Minimum tillage	acres	2,441,882	14,377,013
Mulching	acres	57,793	1,002,869
Open channels	miles	503	16,419
Pasture and hayland management	acres	11,412,082	69,432,872
Pasture and hayland planting	acres	3,212,386	73,494,560
Pipeline	miles	2,635	36,432
Planned grazing systems	acres	6,395,890	43,702,526
Ponds	No.	43,056	1,923,001
Proper grazing use	acres	53,820,200	272,318,948
Pumping plants for water control	No.	2,789	101,698
Range seeding	acres	420,114	16,599,907
Recreation area improvement	acres	57,631	1,294,005
Recreation land grading and shaping	acres	16,334	548,714
Recreation trails and walkways	miles	632	11,167
Roads, access	miles	2,387	26,514
Spring developments	No.	3,333	138,055
Stock trails and walkways	feet	294,324	21,685,354
Streambank protection	miles	514	9,420
Stream channel stabilization	miles	48	1,093
Stripcropping	acres	402,049	22,634,604
Structures for water control	No.	48,995	2,131,653
Terraces, basin	miles	178	2,537
Terraces, gradient	miles	6,630	724,396
Terraces, level	miles	4,307	437,236
Terraces, parallel	miles	3,976	83,580
Total terraces	miles	15,091	1,247,749
Toxic salt reduction	acres	40,720	1,600,441
Tree planting	acres	366,324	20,318,210
Troughs or tanks	No.	11,141	550,926
Waterspreading	acres	67,427	1,216,595
Wells	No.	8,418	603,656
Wildlife upland habitat management	acres	9,106,928	52,070,944
Wildlife watering facilities	No.	1,035	30,605
Wildlife wetland habitat management	acres	539,166	6,065,442
Woodland direct seeding	acres	17,025	680,446
Woodland improved harvesting	acres	1,515,762	32,637,379
Woodland improvement	acres	384,719	16,121,892
Woodland pruning	acres	18,250	184,405
Woodland site preparation	acres	255,662	4,901,575
Land treated			
Land protected during development	units	848	6,946
Land protected during development	acres	24,417	217,107
Land adequately treated	acres	32,712,703	—
Land adequately protected	acres	—	1,187,323,539
Land use conversions[1]			
Cropland to grassland	acres	960,195	27,767,567
Cropland to woodland	acres	27,115	2,861,987
Cropland to wildlife-recreation	acres	62,945	1,708,775
Cropland to "other"	acres	71,849	6,773,817
All other uses to cropland	acres	120,604	8,377,296
All other uses (except cropland) to wildlife-recreation	acres	579,469	9,937,357

[1] Conversions on the land, June 30, 1973, are estimates of conversions since July 1, 1962.

be tied into the Conservation Needs Inventory (CNI) data to make the CNI more useful. In addition, tables for soil survey manuscripts are being produced from interpretation data on a trial basis and will be available for general use soon.

Some states are using automatic data processing systems, such as MIADS (Map Information Assembly and Display System), for producing interpretive maps by computer. These computer printed maps are useful to area and regional planners in making decisions and in informing the public about soil related problems.

Soil survey investigations. SCS maintains soil survey investigation units at its four technical service centers. Soil survey laboratories in these units performed 33,000 individual analyses of physical, chemical, and mineralogical properties of soils during fiscal year 1973.

About one-half of this work consisted of selected analyses on individual soil samples to answer questions on soil classification and interpretation. The other half consisted of comprehensive characterization of complete soil profiles.

A system of computer storage of these data is being developed by SCS to make them more readily available.

The soil survey investigations units continuously strive to develop more useful and more relevant information. Currently, work is underway on methods for characterizing water movement in the soil and on studies on the amounts and the movements of phosphates and other potential pollutants.

Cartographic operations. The Cartographic Division completed 3.5 percent more work covered by CO funds and 11 percent more recoverable work in fiscal year 1973 than in fiscal year 1972.

Map manuscript compilations for 90 soil surveys were completed and sent to the Government Printing Office for publication.

Photobase map sheets for the published soil surveys are obtained from high-altitude photography for areas of low relief. Orthophotography is required in areas of excessive relief if the publication scale is to be 1:20,000 or smaller. SCS contracted with the U.S. Geological Survey for this work. Use of orthophotographic techniques reduces appreciably the SCS man-years required in making mosaics.

During the fiscal year, 135 areas (68,780,800 acres) were contracted for high-altitude photography.

Topographic maps for 127,119 acres were stereoplotted for conservation operations or for use in watershed projects, river basin studies, or resource conservation and development projects. In addition, 5,332 acres were plotted with profile and cross-sections for flood hazard analysis.

The number of conservation plan maps and soil capability maps decreased last year by approximately 20 percent. Conservation resource planning and implementation expenditures exceeded those of fiscal year 1972 by 52 percent—an indication of shifting program emphasis.

Cartographic requirements for RC&D and watershed projects increased more than 50 percent in fiscal year 1973.

Land inventory and monitoring

Each watershed plan, river basin study, resource conservation and development plan, waste water management plan, and national assessment, such as the wetlands inventory and the shoreline erosion inventory, requires factual resource data. Timely and comprehensive data are needed to develop resource use alternatives and to assess the impact of planned activities on the environment.

In 1973, a Land Inventory and Monitoring (LIM) Division was established. The objective of LIM is to provide land owners and users with data on (1) kinds, amounts, and locations of soil, water, and related resources; (2) suitability or limitation of those resources for various uses; and (3) changes and trends in use, extent, and condition of those resources for conservation, development, community planning, and environmental improvement.

Five task forces were assigned to prepare definitions and develop new procedures for surveying, inventorying, and monitoring wetlands, flood plains, prime and unique farmlands, erosion and sediment damages, and soil and water conservation reporting, practices.

Accurate data on soil, water, and related resources can give greater authority to land-use policy and assist communities, regions, states, and the nation in land-use planning activities. ♦

One plus one—double cropping grows in the Corn Belt

For the first time in many years, farmers and ranchers in this country are being urged to produce as much as they can. Where will the extra acres for production come from?

In some places, there just aren't any extra acres that are suitable for crop production, so the same acres that produced a crop of red winter wheat or barley are used to produce a second crop in the same year. Much of this land is better protected from erosion than similar land producing only one crop per year.

Double cropping has been used in some areas of the South for years, but technology has been pushing it northward. Improved equipment and chemical weed



Soybeans are proving to be a real bonus as a second crop in the southern part of the Corn Belt, and with no-till planting, soil moisture is saved and every growing day is utilized by the second crop.

by Roy E. Hamilton
Conservation agronomist, SCS
Indianapolis, Indiana

control have been key stimulators.

Proper plant varieties and careful timing of operations are making the second crop a real bonus in the Corn Belt's southern border.

Woodrow McFadin is a farmer in Posey County, Indiana, who has always looked for new and better ideas. A supervisor of the Posey Soil and Water Conservation District since 1970, he is serving as it's secretary. McFadin also sits on the Executive Council of the Four Rivers Resource Conservation and Development Project.

In June 1972, Bob Steele, the Soil Conservation Service's district conservationist at Mount Vernon, suggested that McFadin try double cropping using the no-till method. The farmer was eager. He had grown 52 acres of Arthur wheat, which yielded 50 bushels per acre, and had plowed 40 acres of the wheat stubble for beans. Extremely dry weather late in May and in June had made plowing doubly difficult. "We had to go very slowly because the automatic breakaway would trip," McFadin said. "We disked and cultipacked the field three times before planting."

McFadin hired Lester Pfeiffer, a neighbor owning a no-till planter, to custom plant the 12 acres that remained unplowed.

On June 29 and 30, both the plowed and unplowed fields were planted to Culver soybeans at the rate of 2 bushels per acre. The soil was so dry that 50 gallons of water per acre were applied during planting to encourage germination.

Both fields had received similar management practices over the past several years, and for the soybeans they received the same fertilizer and herbicide treatment.

Beans in the plowed field were rotary hoed twice and cultivated once; the no-till beans received no further care until harvest.

Combining revealed the results. The plowed field yielded 17 bushels of soybeans per acre, and the no-till field yielded 23 bushels per acre. "I won't plow any more wheat stubble," said McFadin.

McFadin's success convinced him to go entirely to no-till double cropping in 1973. He asked Pfeiffer to plant his entire 175 acres of wheatland to double-crop beans. But, because early wet weather forced a late planting season, Pfeiffer could not find time to do the planting. Nor could McFadin find anyone else—the weather had put everybody behind in their work.

McFadin began looking for a no-till planter to buy. By the time he found one in Illinois, he had lost more than 2 weeks of optimum planting time.

Even with late planting, McFadin's crop was a success. He harvested 45 bushels per acre of wheat. He followed the same treatment program of the previous year on his beans, but hail severely damaged 75 acres. The yield was only 13 bushels per acre. The remaining 100 acres averaged 26 bushels per acre, even though the weather had turned dry during part of the growing period.

Many other examples of success with no-till double cropping stand out in the Corn Belt. More and more farmers are finding that plowing for a second crop is a self-defeating exercise. Plowing not only is time consuming, but it is also a soil drying operation. In many areas, the heaviest rains occur in midsummer when newly plowed soil is exposed to erosion.

With no-till planting, soil moisture is saved and every growing day is utilized for the second crop. Many farmers are planting the second crop the same day that the first crop is harvested. Soil is protected against erosion by the small grain root system and straw mulch left after harvest.

Double cropping is growing in the Corn Belt. And the no-till method of double cropping is winning favor as farmers learn how they can produce more with less cost, less time, and less soil loss. ♦

Maine's way of maintaining her natural areas

by Robert Wengrzynek
Soil conservationist, SCS
Auburn, Maine
and Herbert Hartman
Natural areas coordinator
Natural Resources Council
Augusta, Maine

Natural areas are examples of the dwindling number of places in our country where outstanding qualities or processes of nature operate relatively undisturbed. Archeological and historical sites share this concept because of their uniqueness.

More than 2,000 natural areas in Maine have been inventoried and evaluated by the Natural Resources Council (NRC) of that state. Computerized information is available, through Maine's eight planning districts, for planning municipal land use and making zoning decisions.

The New England Natural Areas Project, of which Maine's NRC is a cooperator, has enabled Maine to formulate protective programs geared to the state's need and to focus public attention on the urgency of a land use policy to aid all of New England.

In the first phase of this project, which is sponsored by the New England Natural Resources Center, the natural areas throughout New England were identified, classified, and described. A comprehensive data base was thus established.

In phase two a regional plan was developed to protect natural areas as major economic, ecologic, and esthetic assets. A study was made of existing natural area protection procedures, and the need for a Natural Areas Advisory Board to assist in planning was established.

Publicity given to natural areas is minimal, and distribution of data is limited to protect the sites, 82 percent of which are privately owned, and the land around them from speculative development. The 18 percent of the sites that are in public ownership also



Reid State Park is one of Maine's natural areas. It needs protection from misuse and overuse.

Classification of Maine's natural areas according to predominant features

Predominant feature	*Number of areas*
Geologic	583
Hydrologic	553
Soils	17
Flora	157
Fauna (Terrestrial Animals)	24
Fauna (Birds)	221
Fauna (Aquatic)	54
Archeological	222
Cultural/Esthetic/ Visual	194
Total	2025



Mountains and lakes of unspoiled natural beauty are among the more than 2,000 places that Maine has designated as natural areas. (Photo courtesy of Robert Cummings, *Portland Press Herald*, Portland, Maine.)

can be easily destroyed by overuse or misuse.

Reid State Park is an example. Public use of the area has contributed to destruction of protective vegetation on the natural barrier dunes. Beach erosion, sediment buildup in a salt marsh, destruction of a public recreation area, and loss of unique wildlife habitat are among the bitter results. Restoration of the park has been proposed as a Time and Tide Resource Conservation and Development Project measure by Maine's Department of Recreation. Reestablishing vegetation and people control can help to restore the area.

Elimination of all natural areas from public use is not the objective of protective consideration. On the contrary, such areas could be enjoyed by the public and used for scientific research, teaching, protection of rare or endangered plants and animals, and preservation of natural and cultural heritage.

The inventory of natural areas is only a beginning. Interest in their protection, whether through municipal zoning, protective acquisition, or conditional approval or disapproval of development by regulating agencies, indicates public awareness and concern for natural resource values. ♦

Woody plants for Maryland highways



Weeping lovegrass and sericea lespedeza protect slopes along the John F. Kennedy Memorial Highway while woody plants become established.

New highway construction and roadway safety improvements are creating thousands of acres of mowable sod right-of-way each year. Maryland annually seeds and mulches 500 to 1,000 acres of disturbed soil on highway projects. At a time when maintenance costs are increasing, this continued planting of a mowable cover is in question.

Seeded roadside slopes will usually deteriorate if not maintained. In the humid East, many small gullies and interspaces of bare soil form on neglected slopes. Woody plant seedlings germinate and become established in the interspaces, but it may take nature 3 to 10 years or more to develop a stand of seedling shrubs or trees in the interspaces.

The cost of planting seedling shrubs and trees on hundreds of acres of highway right-of-way to introduce woody plants is prohibitive. And direct seeding of woody plant material has been tried with little success in a number of states.

In 1966, the Soil Conservation Service's National Plant Materials Center in Beltsville, Maryland, in cooperation with the Federal Highway Administration and the Maryland State Highway Administration, started a program to study effective, economic ways to establish woody plant materials on roadsides.

The cooperative program has two objectives: to find effective and economical methods of establishing low maintenance woody plants on parts of the right-of-way and to present a more varied landscape to the motorist. The overall objective of the program is to reduce maintenance costs on seeded areas and, at the same time, stabilize slopes, control erosion and sediment, and add to the natural beauty of the roadway.

The first task of the project was to compile a list of species considered suitable for trial plantings. Then, for 2 years, the work included testing and selecting species, studying species adaptability, seed treatment and seedbed preparation, testing mulches and mulch anchoring,

by H. W. Everett
Plant materials specialist, SCS
Lexington, Kentucky
John A. Dickerson
and J. H. Kimmons
Soil conservationists, SCS
Beltsville, Maryland

modifying seed mixtures, and improving planting techniques.

Woody plant seeds were hand planted in greenhouses and in cold frames to evaluate stratification and planting depth requirements. Seedling stock performance was evaluated in each of Maryland's three climatic zones.

Hand planting of woody plant seeds on roadside slopes proved valuable in determining seeding rates. A chopped fiberglass and straw mixture proved satisfactory for mulching highly erodible sites, but machinery for applying such a mixture is not yet available.

Either a mulch-anchoring tool or bulldozer tracking is used to incorporate the seed and clean straw or hay mulch. Grass and legume species that leave interspaces free for the establishment of woody plants are being investigated further.

A weeping lovegrass and sericea lespedeza mixture was used in many of the test hydroseedings in areas where woody plants are needed. This mixture proved successful in spring and summer seedings in the Coastal Plain and Piedmont climatic zones. Fall and winter seedings of other species in the Appalachian zone look promising.

Coralberry, false indigo, shrub lespedeza, Japanese bush lespedeza, amur honeysuckle, ninebark, redbud, viburnums, bristly locust, and several species of sumac have been established by direct seeding; these species are still being evaluated.

Red oak has been successfully hand planted on roadside slopes along Maryland's John F. Kennedy Memorial Highway. Five to seven acorns are placed in each shallow planting spot and covered with soil. The plants take up to a year to emerge, depending on the time of planting.

Testing and field studies are still underway on highway slopes in Maryland's three climatic zones. About 100 acres in the three zones have been test-hydroseeded since 1967. Modifying the original seed mixture produced stands of woody plants by direct seeding in the first year. All of the plantings are not fully evaluated but will be before the cooperative project terminates in 1976. ♦



Grass and legume species that allow woody plants, like this seedling of a woody lespedeza, to emerge and become established are being studied along Maryland's highways.

conservation in action

Soil data and sewage disposal

A new approach to onsite sewage-disposal problems has been developed in Vermont's White River Natural Resources Conservation District.

The district inspects proposed sites for sewage disposal and provides towns with data on site conditions and design criteria. Towns can then make decisions and maintain local control.

Governor Thomas Salmon endorsed the program with a comment that it "has the potential for being used on a statewide basis."

The White River Natural Resources Conservation District developed the idea in response to numerous questions about sewage disposal. Assistance was provided by the East Central Vermont Resources Conservation and Development Project.

The Orange County Soil Survey is used as a basis for the technical services that the district provides to towns. Such services ordinarily would be beyond the financial capability of most towns.

Soil, properly used, is one of the most efficient and economical means of sewage disposal. But not all soils are alike. Texture, profile characteristics, drainage, depth, and slope affect the usefulness of soil in sewage disposal.

Orange County soil maps show more than 40 different kinds of soils. Will Sheehan, a Soil Conservation Service soil scientist, has separated these soils into 10 groups. The soils within each group have similar characteristics affecting sewage disposal. SCS, Extension Service, Vermont Departments of Water Resources and of Health, and regional planning and development commissions cooperated in developing a sewage system design for each soil group.

The conservation district is training a new employee to bring this information to towns and individuals. Through contracts with towns, the district furnishes a specialist to do the onsite inspections, supplies design criteria, gives construction assistance, and provides completion checks and periodic maintenance inspections. All of the services are funneled through the town, so the town can maintain control and enforcement responsibilities.

Arthur Hyde, chairman of the White River Natural Resources Conservation District, and his fellow district supervisors, believe the program can solve many of the sewage problems in their district and in the state.—BARRY STRYKER, *area resource development specialist, Vermont Extension Service, Montpelier, Vermont, and* WILLIAM T. STEELE, *district conservationist, SCS, Randolph, Vermont.* ♦

Pear trees, orchardgrass, and Angus cattle

A clamoring flock of guineas announces your entry into the driveway of Richard and Helen Elliott's Pear Tree Ranch in Llanito, New Mexico.

Not so long ago, Llanito was a distinct community. Now, school buildings and houses that have sprung up on each side of Highway 85 make it difficult to distinguish Llanito from the town of Bernalillo.

To Dick and Helen Elliott, retirement means rural living. And they found an ideal spot in Llanito, about 20 miles north of Albuquerque.

After retiring from 24 years of active and reserve service in the U.S. Air Force, Elliott served as information director for the U.S. Atomic Energy Commission in Los Alamos and Albuquerque until he retired again in 1972.

The Elliotts planned their retirement as carefully as they plan other activities. In 1959 they bought 12 acres of irrigated land in Llanito. Mrs. Elliott promptly named it Pear Tree Ranch because of the sturdy pear trees growing there. After building a house, barn, and corrals, the Elliotts were ready to make Pear Tree Ranch their home.

Revamping the irrigated acres became their major activity. In August 1959, Elliott became a cooperator with the Sandoval Natural Resource Conservation District and got help from the Soil Conservation Service in developing a conservation plan for Pear Tree Ranch.

Fields were staked, surveyed, leveled, and planted to fescue, orchardgrass, ryegrass, and clover. Irrigation ditches were relocated and lined with concrete. Metal gates for irrigation were installed. Shade trees, evergreens, and Russian olive were planted in field borders.

Elliott bought purebred Angus cattle to make use of all that grass. Cross fences were installed to divide the 12 acres into 6 separate pastures. Water was piped to each pasture, and drinking tanks were installed.

Elliott soon learned that grass doesn't grow rich and vigorous without some help. And he learned that grass continuously grazed too short becomes weak and unproductive. He learned something about cows too. If allowed, they will graze parts of a pasture almost to the ground, leaving ungrazed clumps to become coarse and unpalatable.

So Elliott started using a rotation grazing system. His herd, averaging 15 grown animals, is kept in one pasture until the grass is grazed to a height of about 4 inches. The cattle are then moved into another pasture or into the feedlot for a few days. Each pasture is rested for 2 or 3 weeks, during which time it is irrigated. But in some years there isn't enough water in the Rio Grande for irrigation, and there are times when sudden rainstorms overload the canal and break its banks. Then, no irrigation is possible until repairs are made.

Irrigating and fertilizing and feeding, grooming, and showing cattle require more time than the Elliotts have. So Pear Tree Ranch provides part-time employment for others. High school boys almost always have first priority for the jobs.

Elliott is a former supervisor of the Sandoval Natural Resource Conservation District. He admits to having a deep love for conservation and gives a lot of credit to his conservation plan for the good life he and his wife have at Pear Tree Ranch.—DICK BARBER, *district conservationist, SCS, Raton, New Mexico.* ♦

Water, water, everywhere

When Sam Kelly bought 8 acres of land on Tripp Road in the Dallas suburb of Sunnyvale, he envisioned the good life in a rural atmosphere—a new house, a barn for his horses, a few cows, and, most of all, a place for his family to enjoy country life.

What Kelly didn't envision was the problem of excess runoff water on his property.

This problem didn't come up until Kelly had almost finished his new house. Then the rains came, and Kelly discovered that his new house was directly in the path of runoff water from his property and adjoining lots.

"My wife called me at work one day," Kelly said, "and all she could say was, 'Sam, there's water everywhere!' " Kelly called the Soil Conservation Service in a hurry. "I had seen a public service spot announcement on television that mentioned assistance was available from SCS on problems such as mine."

After Kelly's meeting with SCS specialists, a plan was worked out to install a diversion terrace to intercept the runoff water. The terrace was designed to empty into a grassed waterway which carries the water to a safe outlet away from the house and surrounding buildings.

Recently, Kelly reported that the terrace and waterway both work well.

"When it rains," Kelly said, "there's still water everywhere, but its in the right place."—R. D. TIDWELL, *soil conservationist, SCS, Dallas, Texas.* ♦

Recon . . .

Ski areas acquitted. Indicted as threatening to the environment at the start of New England's Environmental Symposium on Stream Quality were ski areas and other recreation developments. Participants, however, left the symposium with a conviction that there are many more serious ecological threats. Cited as especially dangerous were paper mills, sand and gravel operations, municipal sewage, highway construction and salting, algae, and logging operations.

Held during two autumn days in Franconia, New Hampshire, the symposium was one of New England's first attempts to join business, conservation, scientific, and public interest groups for knowledge-sharing and discussion of differences.

A USDA representative at the symposium presented evidence from a study conducted near Waterville Valley, New Hampshire, showing only minor, unharmful chemical changes in water from the ski area there.

A new breed of ski developer, active in community affairs, is already here, believes John Christie, owner and general manager of a ski development at Rangeley, Maine. The new breed deems it economically necessary to discourage sloppy secondary development detrimental to recreational value, he said.

Ecology hot lines. The Michigan Natural Resources Department's Environmental Protection Branch has begun a telephone hot line to answer environmental queries. The hot line's recorder system operates 24 hours daily. In Oregon, a "recycling switchboard" was established by the Environmental Quality Department to provide statewide recycling information. In a similar vein, the Illinois Environmental Protection Agency's Speakers Bureau is on the alert to address groups interested in ecology.

"Mini-Ranch and Fun Farming" is the title of a course being taught by SCS retiree Henry Dierking at Community College in Muskegon, Michigan. Dierking designed the class mainly for landowners interested in developing 1- to 50-acre spreads.

First-class soybean soils are: (1) moderately deep to deep; (2) well drained to moderately well drained; (3) medium textured; and (4) on level or gently sloping land where runoff and erosion are minimal. Farmers hoping for above average yields should plant their soybeans in carefully selected soil, says University of Tennessee agronomist George J. Buntley.

Spring a satellite garden. If forced to stay at home this spring because of fuel shortages, many people may turn to gardening in their own yard. Another idea, proposed by Howard Walters in *The American Rose Magazine*, is planting satellite gardens in a variety of territories near home—a vacant lot, an elderly neighbor's yard, a retirement center, a school, a church. Walters stresses obtaining interest and cooperation of appropriate authorities before beginning satellite garden projects. Just think—you might stimulate others to start satellite gardens in their neighborhoods.

Chicken litter reclaims land. Having fertilized northern Arkansas pastures for many years, chicken litter composts are now being used to reclaim southern Arkansas land nearly destroyed by salt wastes from oil wells. Grass planted in a litter compost test plot has done well for three growing seasons. Soil tests indicate the land is effectively reclaimed. Six tons of chicken litter per acre were applied; switchgrass, millet, bahia, bermudagrass, and lespedeza were seeded. Later, the plot was overseeded with fescue and crimson clover.

SCS, Cooperative Extension Service, University of Arkansas Agricultural Experiment Station, and Graduate Institute of Technology studied the salt water waste areas.

They never read an environmental impact statement. Eager beavers are creating problems on some channel clearing projects where SCS is assisting local sponsors. In some places, beavers are rebuilding wooden dams as fast as they are torn out—and using trees marked for preservation in the process.

SOAR, Scouts! The Boy Scouts of America will launch their 1974 Project SOAR (Save Our American Resources) campaigns on Scouting Environment Day, March 23. Energy conservation and recycling of materials discarded as waste are key 1974 SOAR activities. Conservation action and education projects will be continued.

Scouts and Keep America Beautiful, Inc., will join efforts on April 27, which has been designated National Scouting Keep America Beautiful Day. Emphasis on that day will be on improving wildlife habitat, planting trees and shrubs, and cleaning up trash.

Review

New publications

Snow Survey Sampling Guide. *Revised, 1973. USDA Agr. Hbk. 169. 32 pp., illus.* **$0.55.** This pocket-size training-reference guide is designed for snow surveyors who use snow sampling equipment to measure snow accumulation in mountainous areas of the West. Clearly detailed are sampling and recording procedures for forecasting water supplies and related purposes.

Major Uses of Land in the United States—Summary for 1969. By H. Thomas Frey. *1973. USDA Agr. Economic Rpt. 247. 42 pp., illus. with graphs and charts.* Our country's land area totals about 2,264 million physically diverse acres. Crop and livestock production occurs on about 57 percent of the area. Nearly a quarter is ungrazed forest land. Remaining acres are divided among urban and transportation uses; recreation, wildlife, and other special uses; and essentially unused areas. An inventory of major U.S. land uses as of 1969 is summarized in this report.

Feedlot and Ranch Equipment for Beef Cattle. By D. F. Stephens. *Revised, 1973. Farmers' Bull. 1584. 17 pp., illus.* **$0.25.** Equipment and shelters essential for successful beef cattle operations are described and illustrated. Pasture or range shelters, feedlot equipment, and corral equipment explained in the pamphlet are designed to be both safe and practical.

Johnsongrass . . . As a Weed. By C. G. McWhorter. *Revised, 1973. Farmers' Bull. 1537. 18 pp., illus.* Brought to this country during the early 1800's for use as potential forage, johnsongrass is now considered one of the world's 10 worst weeds. Growth habits of johnsongrass are described before the author explains cultural control methods, chemical control, and combination methods to suppress the weed.

Controlled Environment Agriculture: A Global Review of Greenhouse Food Production. By Dana G. Dalrymple. *1973. USDA Foreign Agr. Economic Rpt. 89. 150 pp., illus.* **$1.50.** Since nature is generally master out-of-doors, greenhouse food production may become a way of controlling the environment in agriculture of the future. Long associated with flower production, greenhouses are rapidly developing as food producers. The report does point out that economic, labor, and fuel requirements may handicap this unique form of agricultural production.

Building a Pond. *1973. Farmers' Bull. 2256. 14 pp., illus.* **$0.25.** This bulletin may help you decide

Meetings

February

- 10–14 National Association of Conservation Districts, Houston, Texas
- 20–23 American Camping Association, Atlanta, Georgia
- 21–22 Southern Forest Institute, Atlanta, Georgia
- 24–Mar. 1 American Association for the Advancement of Science, San Francisco, Calif.
- 27–Mar. 1 Land Improvement Contractors of America, Williamsburg, Va.

March

- 8–13 Associated General Contractors of America, San Diego, Calif.
- 9–13 Association for Supervision and Curriculum Development, Anaheim, Calif.
- 10–14 National Farmers Union, Milwaukee, Wisc.
- 10–15 American Society of Photogrammetry, St. Louis, Mo.
- 15–19 National Science Teachers Association, Chicago, Ill.
- 17–22 American Concrete Pipe Association Technical Conference, San Francisco, Calif.
- 26–28 Agricultural Research Service Water Harvesting Symposium, Phoenix, Arizona
- 28–31 National Wildlife Federation, Denver, Colo.
- 31–Apr. 3 North American Wildlife and Natural Resources Conference, Denver, Colo.

April

- 3–5 Twelfth Annual Symposium on Engineering Geology and Soils Engineering, Boise, Idaho
- 3–6 National Rivers and Harbors Conference, Washington, D.C.
- 8–12 American Geophysical Union, Washington, D.C.
- 28–May 1 Association of American Geographers, Seattle, Wash.

May

- 12–16 National Council of State Garden Clubs, Inc., Boston, Mass.
- 19–25 Soil Stewardship Week
- 20–23 American Institute of Architects, Washington, D.C.

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D. C. 20401

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
U. S. GOVERNMENT PRINTING OFFICE
AGR 101

MOVING? Send present mailing label and new address, including zip code, to Division of Public Documents, U.S. Government Printing Office, Washington, D.C. 20401.

whether a pond is the answer to water supply difficulties on your land. Details on how to build, maintain, and use ponds are packed into the publication.

The Demand and Price Situation for Forest Products, 1972-73. By Dwight Hair and Robert B. Phelps. *1973. USDA Misc. Pub. 1239. 87 pp., illus. with charts and graphs.* Demand for timber products is rapidly growing. Yet, supplies cannot rise significantly unless forest management, utilization, and research programs are stepped up. This publication helps explain 1972-73 trends in production, trade, consumption, and prices of products from our nation's forests.

Field Soil Water Regime. *1973. Soil Science Society of America, Inc., Madison, Wisconsin. SSSA Special Pub. 5, 212 pp., illus.* This volume includes the papers presented at the August 16, 1971, symposium held during the annual meeting of the Soil Science Society of America and American Society of Agronomy. Speakers and subjects reflect a broad spectrum of approaches and research results characterizing the soil water regime.

Four Decades Past the Dust Bowl: The Great Plains Today. *1973. USDA Picture Story 271. 5 pp., illus. foldup.* Like a miracle, the fertile soil, gently rolling hills, and dry climate of the 10 Great Plains states produce food and fiber, making the United States a top agricultural nation. Pictures vividly illustrate the dusty story with a happy ending.

The Outlook for Timber in the United States. *1973. USDA Forest Resource Rpt. 20. 367 pp., illus. with graphs and charts. $3.25.* This report analyzes timber resource supply and demand for the next few decades. It indicates challenges American forestry must face. Demand for timber products is rising much faster than supplies can be grown to meet it. Yet, lands suitable for timber crops must also provide products like recreation, water, and wildlife.

PERIOD. READ. RM.

SOIL conservation

U. S. Department of Agriculture/Soil Conservation Service/March 1974



JUN 13 '74
PROCUREMENT SECTION
CURRENT SERIAL RECORDS
U.S. DEPT. OF AGRICULTURE

Wetlands and wildlife and weather

The importance of wetlands—marshes, bogs, swamps—is particularly evident at this time of year. For it is when the rains of early spring trickle, then fall, then pour down in nearly flood force that people are most aware of the need for natural or manmade ways to control or absorb excess water. It is then that wetlands do their "serious" job of sponging up extra rainwater and feeding it slowly back into the nation's streams and rivers.

Wetlands are not wastelands. They have the specific function mentioned. They are havens for birds and nurseries for aquatic life. They provide a major setting for hunters, birdwatchers, and fishermen to pursue their sport. And they are a vast outdoor classroom for amateur and professional scientists because they are the frontier between the two great ecosystems of land and water.

The Soil Conservation Service works with many people to preserve, improve, and wisely use our wetland resources. Perhaps our major—certainly our oldest—type of assistance is to thousands of individual farmers and ranchers. In 1973 alone, SCS assisted landowners to improve more than 9 million acres of uplands and more than 539,000 acres of wetlands for the use of wildlife.

SCS also works closely with organized groups such as the Nature Conservancy. The first "official" SCS assistance to the Nature Conservancy, in fact, was in Finzel Swamp, Maryland.

We continue to work with federal and state agencies interested in wetlands and wildlife. SCS joined with Wisconsin's Department of Natural Resources to help restore part of the 26,000-acre Brazeau Swamp to a more natural state. A road, acting as a dam, had raised the water level and saturated an area beyond its normal capacity, resulting in tree and shrub deterioration and a scarcity of food for wildlife. SCS helped design a channel to lower the water table to its natural level.

SCS people are pleased to be among the men and women actively preserving and improving wetland areas. It is part of our longtime objective of "using each acre within its capabilities and treating each acre in accordance with its needs for protection and improvement."

Wetlands as wetlands have many values. Yet it is a fact that the drainage of some wetlands for agriculture or buildings and other urban uses is as old as civilization. There will continue to be times and places when society feels that the value of a specific wetland, in its natural state, should be superseded by its value for some other purpose. As land use pressures mount, the American people should be fully informed of the special values of all lands, including wetlands, so these can be carefully considered in present and future land use decisions.

Kenneth E. Grant

SOIL conservation

March 1974, Vol. 39, No. 8

Contents

2 From the Administrator

4 Protection of rare and endangered species
by Gerald W. Root

6 An endangered species thrives in northern Michigan
by Glenn E. Lamberg

8 Prescribed burning improves big game range
by Thomas R. Parrish

10 Duskies by the sea
by Winston D. Tooke

12 Patterns for wildlife
by Dale D. Allen

14 A fish story . . .
by William H. Casey

16 The mussels of Markell Canal
by Phil Edwards

17 Shelter for golden eagles
by Wilfred J. Stuart

18 Welcome Wagon for wildlife
by Ernie Busek

19 Wildlife bonanza
by Leon Fager and Barry Wallace

20 Wildlife in your yard: to enjoy and photograph
by Robert O. Koerner

22 Recon

23 Review

23 Meetings

COVER: The Soil Conservation Service is working with landowners in Brevard County, Florida, in preparing conservation plans to help protect the Dusky seaside sparrow, a rare and endangered species. See "Duskies by the sea" on page 10. (Photograph courtesy of National Aeronautics and Space Administration.)

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

EARL L. BUTZ, Secretary of Agriculture.

KENNETH E. GRANT, Administrator, Soil Conservation Service

PHILLIP A. CHAVEZ, Editor

MARYELLEN BERTRAM, Editorial Assistant

SOIL CONSERVATION, the official magazine of the Soil Conservation Service, is published monthly by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. Use of funds for printing this publication approved by the Director of the Office of Management and Budget, July 17, 1973.

Reprint permission: Contents of this magazine may be reprinted without permission. Credit is not required but is appreciated. Photographs are available on request.

Commercial names: Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscription: $3.50 per year, $4.50 foreign. Single copy, 45 cents. Discount of 25 percent on orders of 100 or more sent to same address. Order direct from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Protection of rare and endangered species

by Gerald W. Root
State resource conservationist, SCS
Harrisburg, Pennsylvania

A national effort is underway to protect rare and endangered species of plants and animals, and many agencies and organizations—public and private—are cooperating in this effort.

Fortunately, enough public support has been gained to make significant progress in preventing extinction of several endangered species. Much more needs to be done, however, in protecting and managing habitat, understanding food chains, and identifying plant site requirements to prevent further decline of certain species.

In Pennsylvania, the Soil Conservation Service has gathered lists of rare and endangered species from federal, state, and private sources in an effort to assist in the compilation of a state list. A draft list has been sent to more than 150 colleges, universities, government agencies, and organizations for review and comment. It not only classifies species as rare, endangered, or questionable status but also attempts to identify habitat or site requirements for each species.

Presently 2 mammals, 10 fish, 1 bird, and 64 plants are in the rare category and 1 mammal, 17 fish, 1 amphibian, 4 birds, and 57 plants in the endangered category. In addition, 197 other plants are placed in a questionable status because of insufficient information to classify them as either rare or endangered.

Included in the questionable status group are some relatively common plants. Mountain laurel (*Kalmia latifolia*), for example, is Pennsylvania's state flower and was once common throughout the state. It is becoming scarce in the northern counties and needs continued protection aginst indiscriminate



At one time, the white-tailed deer all but disappeared in Pennsylvania. Conservation planning and management have increased the herd population to nearly 800,000.



Rare? Current estimates place the black bear population in Pennsylvania at 2,500 animals. An intensive research program by the state's Game Commission is aimed at finding ways to better manage bear range to insure the protection of this species.

collectors of its showy flowers.

Other plants, such as morningglory (Ipomoea *lacunosa*), may be rare in Pennsylvania because they are near the climatic limit of their range. Much more must be done in defining the range of such plants.

With the lesser plants—mosses, lichens, and algae—sufficient information is not available in terms of exact identification, range, and site requirements to determine their scarcity or abundance.

Finally, some plants, such as the box huckleberry (*Gaylussacia brachycera*), are extremely rare in Pennsylvania. Box huckleberry is known to occur only in two localities in the south-central part of the state.

Most of the plants and animals now rare or endangered in Pennsylvania originally thrived in the bogs, swamps, and timbered areas of the state. As man encroached more and more on these areas with his development and use of natural resources, many species declined because they were not adapted to the changed environment.

Fortunately, through efforts of the Pennsylvania Department of Environmental Resources, the Pennsylvania Fish and Game Commissions, the Soil Conservation Service, and other government agencies, large areas are being restored, managed, and protected against further damage by man.

About 10 percent of the state's land area (2.8 million acres) is now in federal or state ownership. Of this amount, about 2 million acres are managed according to a conservation plan for timber production, wildlife, and recreation. Some of these areas may be designated as wetlands, wilderness areas, or wild areas to insure their management and protection for future generations.

The Soil Conservation Service has assisted with the protection and management of about 800,000 acres of wetland and upland wildlife habitat on privately owned land. Most of these areas are maintained in native vegetation and managed to maximize conditions favorable for the preservation of rare and endangered species.

At one time in Pennsylvania's history, elk, deer, and turkey were endangered. Today, the state's deer herd approaches 800,000, turkeys abound, and estimates place the elk herd at approximately 100 animals—indications are that the herd is self-sustaining.

According to naturalists, nature's rate of extinction is about one species every thousand years. Man, in the last 300 years, has destroyed more than 200 forms of birds and mammals. If extinct reptiles, mammals, fish, and plants are added to this list, man's rate of extinction is more than one species per year. Only sound conservation and management of the remaining species, coupled with accelerated research, can reverse this trend. ♦

An endangered species thrives in northern Michigan

by Glenn E. Lamberg
District conservationist, SCS
Roscommon, Michigan

The Kirtland's warbler, a unique and endangered species, is thriving in the burned-over jack pine plains near the Au Sable River in northeastern lower Michigan. The nesting colony there is the only one known in the world.

This shy warbler is very demanding in its nesting requirements. It builds its nest on the dry sand at the base of the jack pine (*Pinus banksiana*). But not just any jack pine will do; the warbler selects only those pines that range from 6 to 15 feet in height. At least 80 acres of dense trees, with intermixed small openings, are needed for each colony of "jack pine" warbler.

Logging and the subsequent fires during the early 1900's in this part of Michigan provided ideal conditions for colonies of the tiny warbler. The effectiveness of recent fire prevention and suppression programs, however, have reduced nesting habitat for the warblers. Today, through the efforts of concerned individuals, organizations, and government agencies, this habitat is being maintained and preserved.

The Michigan Department of Natural Resources and the U.S. Forest Service have developed special programs to provide warbler habitat on both state and federal land. Program work includes controlled burning, special forest harvesting, tree planting, and acquiring private lands where this rare species of warbler is concentrated.

A spring flight takes the Kirtland's warbler from its winter home in the Abaco Islands of the Bahamas to Michigan's droughty sand plains. There, nesting colonies are concentrated mainly in Crawford and Oscoda Counties, between the towns of Grayling and Mio.

Census counts in 1961 revealed the warbler population to be aproximately 1,000. In 1972, the count had gone down to 400. What caused this decline? Apparently habitat conditions in the Bahamas and in Michigan remained satisfactory. Guilt focused on the brown-headed cowbird, an emigrant from the western plains.

The problem arises when the female cowbird lays her eggs in the warbler's nest. This brings about several effects detrimental to the warbler population. The warblers inadvertently raise the young cowbirds instead of their own young, that is, if they don't abandon their nest. In laying her unwanted eggs, the cowbird may destroy the already present warbler eggs. If the warbler eggs are not destroyed, death is usually inevitable for the nestling warblers because they can't compete for food with the much larger cowbird young.

The U.S. Department of the Interior's Bureau of Sport Fisheries and Wildlife has initiated a program to catch cowbirds. In the summer of 1972, nearly 2,000 of the unwanted intruders



Michigan's Huron Pines Resource Conservation and Development Project is backing efforts to protect the Kirtland's warbler, an endangered species. (Photograph courtesy of Michigan Department of Natural Resources.)

were caught, and Kirtland's warbler production per nest was the highest ever recorded.

Kirtland's warbler nesting grounds are in an area covered by the newly formed Huron Pines Resource Conservation and Development Project. Jeremy Jones, chairman of the Crawford County RC&D Committee, has indicated that his committee supports the activities of organizations trying to preserve the tiny warbler. Jones said, "Because of the combined efforts of interested groups and individuals, this is one endangered species that should be around for a long time. The Kirtland's warbler will be around to thrill those who take the time and patience to quietly wait and watch for this unique little creature." ♦

Prescribed burning improves big game range

by Thomas R. Parrish
Soil conservationist, SCS
St. Maries, Idaho

Fire can actually improve big game winter range in northern Idaho, according to a browse rehabilitation study conducted by the U.S. Forest Service and the Idaho Fish and Game Department.

The elk-sustaining brush fields were initially created by wildfire, so fire seemed to be the logical answer to rehabilitating the brush fields.

In the early 1900's, fires in northern Idaho created large expanses of mixed shrub-type vegetation, which proved to be ideal habitat for one of the nation's largest elk herds—presently numbering about 11,000 animals. Since 1934, fire control practices have prevented any large scale burns or reburns in the area.

Several of the major forage shrub species have grown beyond the reach of elk. The problem is most acute on winter range in areas of low elevation along major drainages. Idaho Fish and Game Department's elk census and harvest figures show that elk population in northern Idaho reached its peak in the 1960's and has been declining since.

Prescribed burning of browse is an ecological tool that can eliminate or control the less desirable plants, such as ninebark and oceanspray, and bring about sprouting regrowth of desirable plants that have grown too tall to be accessible to big game. With fire, a plant community can be kept at any level of succession desired.

Trial burnings on small acreages of standing brush in the St. Joe National Forest have brought good results. The tallest parts of shrubs were almost completely killed. Numerous long basal sprouts emerged during the first growing season. Big game forage was increased and became available to the animals.

Cooperators with the Benewah Soil and Water Conservation District decided to try this treatment, initiating control burns on 150 to 200 acres of private land. The treatment is expected to improve habitat for big game as well as grazing for cattle in summer and fall.

Concern over accelerated soil erosion and uncontrolled fire had generally kept this practice out of management programs. But soil erosion did not occur after the trial burnings. By burning just before the plants emerged from dormancy in the spring, the soil was without protective cover of vegetation for only a short period. Moisture in the soil at the time of burning, combined with the use of light fuels, prevented a hot, destructive fire that could have altered soil characteristics. Burning dates were coordinated with the National Weather Service.

Because of prescribed burning and the coordinated efforts of private landowners and government agencies, the prospects look bright for improving wildlife habitat and livestock forage in northern Idaho. ♦





(Above) Examining big game winter range in northern Idaho for browse rehabilitation by prescribed burning.
(Left) With fire, a plant community can be kept at any level of succession desired.

Duskies by the sea

by Winston D. Tooke
Soil conservationist, SCS
DeLand, Florida



A Dusky seaside sparrow.

The Dusky seaside sparrow (*Ammospiza maritima nigrescens)* is a rare and endangered species found no place in the world but in a small part of Brevard County, Florida.

People from many parts of the world visit the Merritt Island National Wildlife Refuge to observe this small dark bird with bright yellow markings above the eye.

According to Dr. James L. Baker, of the U.S. Department of the Interior's Fish and Wildlife Service, "The Dusky has one of the most restricted ranges of any North American bird. The daily movement of an individual bird is restricted to about 300 yards, but it may move greater distances over a period of time."

Cordgrass, commonly known as wiregrass to Brevard County ranchers, is the Dusky's predominant habitat.

"We're not sure what these birds eat," said Dr. Baker, "they feed on the ground and probably eat small insects and other invertebrates."

Dr. Baker, who is conducting a study of the bird, weighs, tags, and measures each bird he captures to help determine age, sex, movement, and life history.

The Dusky is found only in large open areas where there is little encroachment by trees and brush. Its preferred habitat occurs mostly on soils classified by the Soil Conservation Service as Felda and Floridana. Prescribed burning has helped to reduce undesirable brush on these soils. Saltbush, however, presents somewhat of a hazard. It is not eliminated by burning and is used by red-winged blackbirds for nesting. The blackbirds drive the Dusky away from these areas.

The largest threat to the Dusky, however, comes from uncontrolled fires, new roads, land development, improved pasture, and manmade changes in water levels.

Ben Wiggins, an SCS district conservationist, and Dr. Baker have worked together to identify privately owned areas where the Dusky is present and to correlate soil type with preferred Dusky habitat.

"It's our responsibility", claimed Wiggins, "to tell the owners of areas where the Dusky is found about these endangered birds. We want to work with the landowner in preparing a conservation plan that will protect the birds."

The Brevard Soil and Water Conservation District is cooperating in this effort to protect the Dusky.

The bird is also found on the John F. Kennedy Space Center, so NASA is lending help through aerial infrared and color photography which aids in identifying vegetation, moisture, density, and other ecological factors that may affect the Dusky.

The Dusky seaside sparrow has joined the alligator, brown pelican, peregrine falcon, Florida manatee, southern bald eagle, and green turtle as a rare and endangered species in this area. But if the efforts of Brevard County landowners are successful, this tiny sparrow will not vanish from the Florida seaside. ♦

Weighing the Dusky (below, left) helps determine its age and sex. A full-grown male weighs about 20 grams.
Weighed, measured, and tagged (below, right), this Dusky is about to be set free.







On this Texas ranch controlled.

Patterns for wildlife

by Dale D. Allen
Public information officer, SCS
Temple, Texas

Ernest M. "Buddy" Bruni of Laredo, Texas, uses pattern brush control on his ranch to get fatter deer, better hunting, and increased livestock forage.

Bruni alternates 500-foot-wide strips of uncontrolled brush with 800-foot-wide strips of controlled brush. He leaves brush along property-line fences and along creeks and drainageways. His goal is to double livestock production while improving habitat for wildlife, especially deer.

"I am keenly interested in wildlife," said Bruni. "I lease my land for hunting, so game management is part of my overall ranch operation. And strip brush control to me means good wildlife management."

According to Bruni, before he started his grassland restoration work, his land had become so badly infested with brush that forage production for livestock and wildlife was extremely limited. Mesquite, tasajillo and pricklypear cactus, lotebush, blackbrush, allthorn goatbush, and whitebrush would consume all the available moisture, leaving none to support the grasses, legumes, and forbs relished by livestock and wildlife.

Today, it's a different scene. The strips on which brush is controlled look almost like irrigated tame pasture. They contain lush stands of buffelgrass, blue panicum, and sorghum almum, planted on rootplowed land. There are also native grasses, legumes, and forbs.

"At first, hunters didn't like these strips," Bruni said. "They thought I had run off all the deer. But after hunting a few days, they began asking when I was going to do the rest of the ranch this way. They really like strip brush control now.

"Grassland improvement work in patterns opens up an area so you can see the game," Bruni explained. "My hunters are all trophy hunters. They want the buck with the big rack of antlers. Now that they can see the deer, they can be more selective in what they harvest.

"I think I have more wildlife now than when I started in 1969—at least, I see a lot more game now. And the deer are in better condition; there is simply more for them to eat.

"Also, we've noticed that the deer are tamer. They are getting accustomed to seeing people and traffic. Before we opened up the strips, they were so wild that you couldn't get close to them. Now, it's not uncommon for them to merely watch as you drive by in the open grass strips."

Ray Margo, district conservationist for the Soil Conservation Service at Laredo, stressed two important points about brush control work in south Texas. The Laredo SCS office gives technical help to landowners through the Webb Soil and Water Conservation District.

"First, what we're doing is



oot-wide strips of brush alternate with 800-foot-wide strips on which brush is



Cattle graze the lush grasses in the cleared strips.

trying to get grassland back to its original condition," Margo said. "When this area was settled, historians noted that it was a sea of grass with scattered trees and brush. Brush was somewhat thicker along streams. Overgrazing, fire, and drought destroyed the dense grass cover allowing the brush to invade. So we're controlling an unwanted invader.

"Secondly," Margo continued, "deer and most other forms of wildlife prefer to feed along the border between woods and open areas. Wildlife want the forbs, native legumes, and other preferred food plants found on grassland, but they also want escape cover nearby."

Bruni's brush control-grassland improvement program got started with Margo helping him to plan, lay out, and flag the strips. Then the brush was knocked down and raked into piles to avoid scattering the pricklypear. After the brush piles were burned, the land was rootplowed and seeded to buffelgrass, blue panicum, and sorghum almum. A period of deferred grazing and other grass management practices followed.

Laying out a strip in brush that you can hardly walk through is another matter. "It's really a job," Bruni admitted. "First, Margo sketches the pattern onto an aerial photograph. After we agree on the design, we go to the pasture and carefully measure and flag the strips for the contractor so he can cut a trail around each strip."

Bruni said that this type of brush control takes up so much time—on the part of the landowner, the SCS men, and contractor—that many contractors won't take on this type of work.

Bruni uses a checkerboard pattern for brush control on a



Ernest M. Bruni, Jr., inspects an area of uncontrolled brush on his Laredo ranch. Uncontrolled brush uses all the available moisture, leaving none for the grasses, legumes, and forbs preferred by livestock and wildlife.

tract of land southeast of Laredo. He and Margo believe that this pattern may prove better than strips. About half of the brush is controlled, yet deer can go from one end of the ranch to the other without leaving the brush.

Several thousand acres receive pattern brush control treatment in Texas every year, and the practice continues to gain in popularity. Each livestock producer selects a pattern to fit his land based on terrain, type of brush, soils, wildlife needs, and other considerations. Some use zigzags and others leave brush on shallow soils, hilltops, and along drainageways.

Whatever the pattern, Bruni likes the results—fatter game and more livestock forage. ♦

Fish conservation is largely a matter of soil and water conservation.

Most freshwater fish live in ponds, lakes, or streams that get runoff from the land. On its journey, the water picks up a variety of materials — some good for fish, some bad.

Runoff water picks up calcium, phosphorous, and potassium, which are needed by plants in ponds or lakes to make food. These tiny plants are eaten by microscopic animals which, in turn, are eaten by aquatic insects. The insects are eaten by small fish, and the small fish are eaten by large fish. Biologists call this interrelationship between mineral nutrients and the large fish a food chain. Fertile water naturally produces more pounds of fish than infertile water.

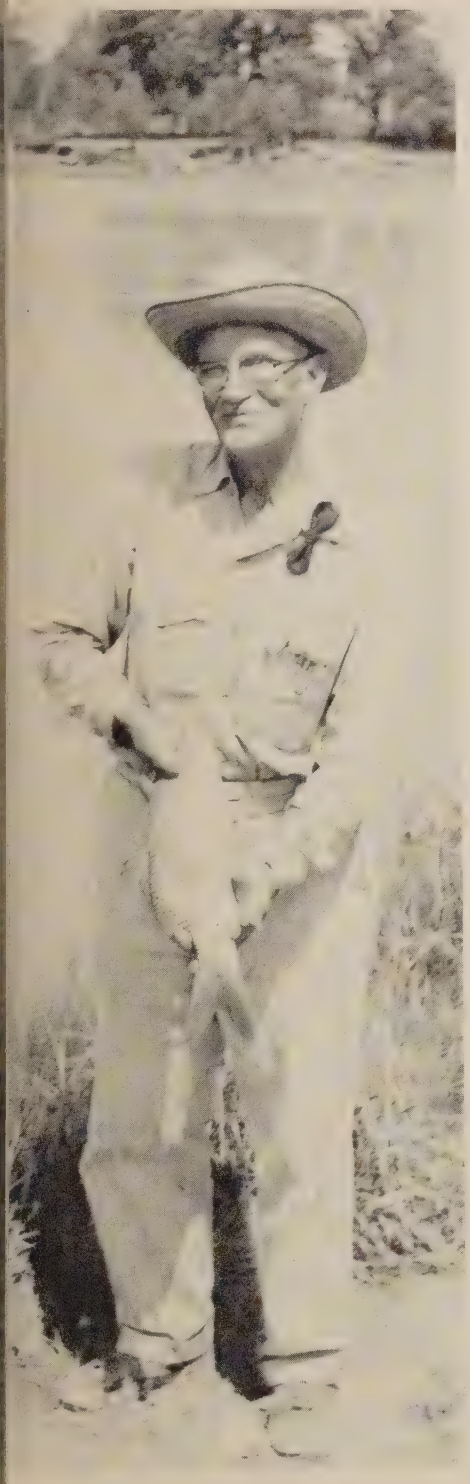
Other good things picked up by runoff water to provide food for some aquatic insects and fish are bits of leaves and other organic matter and some land insects. With fertile water and a little detritus, fish will prosper.

If the water runs off the land over crop fields where conservation practices are not used, through overgrazed pastures, over a construction site where there is much disturbed soil, or down a bare slope of strip mine spoil, the fish will suffer. Sediment has polluted their water.

Sediment can make the water so turbid that those kinds of fish that find their food by sight are unable to do so. In great enough quantity, it will suffocate some kinds of fish by coating their gills. When sediment settles to the bottom of a body of water it smothers bottom-dwelling fish food organisms. Also, sediment reduces the distance to which sunlight penetrates water; this limits the

A fish story . . .

by William H. Casey
Biologist, SCS
Lexington, Kentucky



Clean, fertile water produces healthy fish.

growth of microscopic plants at the food chain's origin. Ultimately, of course, sediment limits the pounds of fish the water can produce.

Herbicides and insecticides carried into a body of water can kill fish or, if the concentration is not great enough to kill immediately, can adversely affect ability to reproduce or make fish more susceptible to parasites and disease.

Water can be too fertile for fish life. Large amounts of inorganic fertilizers or animal wastes carried into the water stimulate growth and multiplication of the microscopic plants. When these plants die, their decomposition robs water of oxygen. Oxygen is needed by fish and other aquatic animal life. Yet nature has given plants first claim to the available oxygen. If there is not enough for both plants and animals, the animals die.

Not all water reaching a stream, pond, or lake arrives as runoff water. Some may issue from underground aquifers tapped by deep mining or oil drilling. Some may be withdrawn for industrial use and then returned. Either way, fish are victims.

Deep mining often exposes mineral deposits to air and water, setting off a chemical reaction that increases the acidity of water. If this acidic water reaches the surface and runs off into a stream, fish and other aquatic life are often destroyed for a considerable distance downstream. The same thing occurs when salt water is brought to the surface by oil drilling and dumped into streams.

Thermal pollution results when water is withdrawn from a stream for industrial cooling or other purpose and then returned to the stream at a higher temperature. Some fish are very sensitive to water temperature changes.

Water quality is determined by the way man uses land and water. Farmers and ranchers can help keep sediment out of streams and lakes by using soil and water conservation practices on their cropland and pastures. They can exercise care in the use of herbicides and insecticides so these harmful materials are not carried into fish waters. And they can build ponds designed to catch and hold animal wastes.

Builders and developers and strip mine operators can build basins to catch sediment from disturbed areas, and they can revegetate those areas as quickly as possible.

Cities can build adequate sewage treatment plants, and industries can install equipment to cool the water they heat in their industrial processes.

For most individuals, the best way to participate in the solution of water quality problems is to study them thoroughly, determine why they are problems and what can be done, and then prevail on public officials to take action. ♦

The mussels of Markell Canal

by Phil Edwards
Biologist, SCS
Raleigh, North Carolina

North Carolina landowners didn't start yesterday to do something about the conservation of their state's native plants and animals. Managing woodlands, planting food and cover plants for wildlife, building ponds for fish, and developing feeding-nesting areas for waterfowl have long been integral parts of their conservation planning.

With today's emphasis on environmental awareness, landowners' interest and concern have broadened to include plants and animals largely overlooked by the general public in the past. One such animal is the freshwater mollusk or mussel living in Markell Canal.

Markell Canal traverses the southwest corner of Pitt County. It was originally constructed by hand. In 1948, it was redug—this time with draglines—to improve farm drainage so crop production and general farming operations could be continued. Another dip-out was performed on the canal in the spring of 1973.

The canal crosses land owned by Lester Garris. It was Garris and his sons, Roland and Kenneth, who first noticed the many mussels being thrown onto the canal banks by the dragline during the 1973 renovation. They began putting the mussels back into the canal. When Soil Conservation Service people visited the site, Roland Garris explained the plight of the mussels. The SCS people collected mussel specimens and sent them to a specialist at Ohio State University for identification.

The Markell Canal mussels, while not particularly rare in North Carolina, were generally considered to be decreasing in numbers. It was also learned that not all creeks in Pitt County had mussel populations. Large populations appeared to be highly localized.

Garris and his sons were joined by the SCS people in returning as many mussels as they could to Markell Canal. Also, they carried mussels to other streams in the county with the hope that new populations could be established.

Farming and wildlife can coexist to the mutual benefit of both. Decisions of whether to have farming operations or wildlife resources do not have to be made in cases like the mussels of Markell Canal. ♦



Freshwater mollusks or mussels were thrown onto canal banks by draglines during a maintenance redigging. The Garris family returned as many of the mussels as they could to the canal.

Shelter for golden eagles

by Wilfred J. Stuart
District conservationist, SCS
Rushville, Nebraska

Golden eagles nest in the shelterbelts of Sheridan County, Nebraska. The 1,200,000 trees that have been planted in shelterbelts in the county in the last 26 years provide the eagles with nesting sites and attract the small mammals and birds they prey on.

The Soil Conservation Service, assisting the Upper Niobrara-White Natural Resource District and cooperating with state and federal wildlife agencies, has observed some of the eagle nests. A golden eagle comes back to the same nest year after year.

Two eggs were found in one nest. Both hatched, but only one of the young eagles survived. The other died in the nest, possibly killed by the stronger nestmate.

Another nest had two young goldens in it. Late one afternoon one was found on the ground near a pine tree; it was still alive. A federal game warden took the bird in and cared for it. It is now in the Henry Doorly Zoo in Omaha.

SCS observations suggest that eagles prefer rabbits for food. Pheasant remains have been found in some nests, and a dead weasel, uneaten, was found on the ground near one of the nests. These are some of the species that inhabit the shelterbeds.

Many naturalists believe that the golden eagle is one of nature's means of controlling the population of rabbits, rodents, and some birds. They doubt that eagles bother livestock if plenty of other food is available.

Legend has it that the choice of the bald eagle as our national bird was a committee compromise. Possibly the golden eagle was considered, as was Benjamin Franklin's choice—the wild turkey.

Had the golden eagle been chosen, Nebraska's shelterbelts would have been instrumental in protecting the national bird. Nevertheless, this mighty bird is well worth protecting. ♦



This young golden eagle is not quite old enough to leave his nest. Golden eagles have found ideal nesting sites in Nebraska's shelterbelts. (Photograph courtesy of Upper Niobrara-White Natural Resource District.)

Welcome Wagon for wildlife

by Ernie Busek
District conservationist, SCS
Waterville, Washington

Living conditions for thousands of residents of Douglas County, Washington, have been vastly improved in the past 2 years because of community concern.

The residents — sagehens, mule deer, mourning doves, songbirds, hawks, badgers, coyotes—live on 60,000 acres of dry wheatland and grazing land heavily infested with sagebrush.

The possibilities for improving wildlife conditions in the county were outlined at a meeting in 1971 of the supervisors of the Foster Creek Soil and Water Conservation District. Attending the meeting were 60 invited landowners and local Soil Conservation Service people.

The first step was to seek financial assistance. The Douglas County committee of the Agricultural Stabilization and Conservation Service allocated $10,000 for the wildlife project, which became known as the Withrow Project.

In 2 years, 45 pits to provide water for wildlife were dug at a cost of about $85 per pit. The pits were about 30 feet square and 8 to 10 feet deep. Sides were sloped and a ramp was built in one corner to provide easy access for four-footed animals. The pits were dug where the water table is only a few feet below the surface; most had 6 inches to 6 feet of water in them by the time digging was finished. The pits immediately began getting heavy use by wildlife.

Some of the Douglas County landowners initiated wildlife projects of their own. Lee Hanford of Bridgeport, for example, developed a spring on his land to provide water for wildlife. But the spring was in a draw, and the spring water and shade from trees growing in the draw attracted cattle. The cattle pulverized the soil, and when run-

More than 45 pits to provide water for wildlife were dug in 1971 and 1972 in Douglas County, Washington. The pits get heavy use by mule deer, mourning doves, hawks, coyotes, songbirds, and other kinds of wildlife.



off from snowmelt came down the draw, it carried away soil and manure, which eventually reached the Columbia River.

Hanford, with growing regard for wildlife and the environment, fenced the draw and seeded the area to perennial grass for wildlife habitat and to prevent further erosion. He set up a small trough to hold water for wild animals and birds and a pipe to take water beyond the fence to the cattle.

Some landowners gave special consideration to sagehens, which have lost much of their habitat in the state. Lloyd McLean, for example, had 160 acres of heavy sagebrush which he meant to spray with a herbicide. That acreage was near a large sagehen strutting ground where the males each March practice the unique sagehen courting ritual. At the suggestion of Don Galbreath and Chet Ball of the Washington State Game Department, McLean left a large area of sage for the sagehens.

Douglas County residents—the human types—have welcomed their wildlife neighbors. They enjoy the songs of birds, the antics of sagehens, and like to hear a coyote's howl once in awhile. The Withrow Project has made living in Douglas County a little better for everyone—people too. ♦

Wildlife bonanza

by Leon Fager
Wildlife biologist, SCS
Flagstaff, Arizona
and Barry Wallace
Range conservationist, SCS
Red Bluff, California

John C. Kadon, of Scottsdale, Arizona, must surely believe that a sow's ear can be turned into a silk purse. Afterall, he transformed a muddy, polluted, shallow stockwater tank into a recreation and wildlife conservation lake.

About 2 years ago, Kadon and his wife, Ann, bought land for a cabin in the Ponderosa woods of northern Arizona. "When we inspected the place before buying," Kadon said, "we noticed the small mud tank and thought then it might be suitable for warm or cold water fish."

After discussing their plan with local ranchers and biologists and engineers of the Soil Conservation Service, the Kadons decided to go ahead with their wildlife conservation project.

Earth-moving equipment extracted or moved 12,000 cubic yards of dirt. The 5-acre lake is actually an earthen dam. It is 10 feet deep and has a 400-foot dike, 20 feet wide, at one end.

Contracting with a private fish hatchery, the Kadons bought catchable-size rainbow trout to stock the lake. Rainbow trout do not reproduce in small ponds, so the lake will have to be stocked every year.

Following SCS' recommendations, Kadon installed a four-strand wire fence around the upper perimeter of the lake to keep out the several hundred beef cattle that roam the open range in the area. The mile-long fence is concealed by trees and bushes, preserving the esthetic appearance of the lake. When the lake is full, the water line extends beyond the fence and provides water for the cattle.

Kadon bought Japanese millet and sago pondweed tubers from wild-game food nurseries in California and central Wisconsin. SCS biologists gave technical assistance in the planting. The millet and pondweed will provide food for wild animals and birds, including waterfowl. Deer and antelope may also be attracted by the game food. Waterfowl already visit the wildlife area.

The Kadons plan to use their lake primarily for relaxation and enjoyment, rather than for fishing and hunting. "We feel that private wildlife and outdoor areas are rapidly diminishing in this country," they said. It is with this concern that the couple built the Lake Ponderosa wildlife preserve. ♦

Wildlife in your yard: to enjoy and photograph

by Robert O. Koerner
Biologist, SCS
Lincoln, Nebraska

Margaret Mead, the noted anthropologist, once said, "People move to the country to escape the city. Soon the country becomes the city."

Nature eludes pursuit. Nevertheless, if you live in the city there are ways of bringing nature and wildlife to you. You can "design with nature," as Ian L. McHarg, chairman of the University of Pennsylvania's Department of Landscape Architecture and Regional Planning, states in his book on the subject. Attract wildlife to your backyard by planting flowering and fruiting trees and shrubs. Border plantings are certainly more attractive than chain-link fences.

After you have attracted animals and birds to your backyard, you can simply enjoy watching them, or if you are a photographer your bonus is an abundance of live wildlife models.

Here is the method I have used to take wild animal portraits.

First, I enlisted my family in helping to develop an area in our yard that made wildlife want to visit or live there. Following a landscape plan, we planted trees, shrubs, vines, and flowers. When these had grown sufficiently to attract wildlife, we put up a feeding station. This can be done in several ways. We built ours near a window that could double as a photography blind and viewing station. Behind the feeder we built a frame to support vines, such as bittersweet, and other plants, such as firethorn and multiflora rose. By having a natural background the quality of wildlife photographs is greatly improved.

Berries and fruits on the plants provided natural winter food for cardinals, bluejays, evening grosbeaks, tufted titmice, nuthatches, juncos, chickadees, and other songbirds. When this food was gone we replaced it with fruit-laden branches from field plants or from border plantings in the yard that needed trimming.

If you encourage the concentration of birds with a feeder, you should be prepared to assume certain responsibilities. One is that the birds become dependent on you for their food. Plan to have a full winter-long feeding program or don't start one at all.

Another responsibility is keeping house cats away from birds. Even though you may not own a cat yourself, the neighbors usually do. A collar with several bells on our cat did a good job of keeping him and the birds apart.

A feeding station attracts more than just birds. Last winter five fox squirrels paid regular visits to our feeders. We did not try to discourage them. Some squirrels became so tame that they would eat from our hands.

Starting with the first snowfall in October 1971 and ending in May 1972, we tried to see how many birds we could attract and photograph at our feeding station. Taking photographs through a glass windowpane proved unsuccessful. So, we removed the entire window and replaced it with a sheet of plywood. Then we cut holes in the plywood big enough to get a single lens reflex camera and electronic flash head through them. We cut a third hole for viewing, so that we didn't have to look through the camera lens all the time. When not in use, the holes were covered with sheets of clear, rigid plastic secured by wing nuts.

To keep cold air out while

If you want to attract birds to your home, you can get information on plants, soils, and conservation methods at your local conservation district office. The Soil Conservation Service, as part of its assistance to conservation districts, helps land owners and users to apply many conservation practices that increase wildlife.

The following U.S. Department of Agriculture publications may be helpful:

Conservation plantings for the Northeast (PA-940)

Conservation plantings for the Midwest (PA-982)

the camera and flash were extended through the openings, we cut flat pieces from an old rubber innertube large enough to fit over the openings. The rubber was secured to the plywood in the same manner as the plastic sheets. Then, in the center of the rubber covering we cut a round hole just slightly smaller than the lens. When the lens was extended through this opening, outside air was kept out of the house. This allowed us to set up the equipment on weekends and leave it. When activity picked up at the feeding station, we could observe and photograph.

During the winter we saw





Evening grosbeaks (above) are quite tame and easy to photograph, especially where there's a lot of sunflower seeds.
(Left) A bird feeding station attracts more than just birds.

and photographed 18 bird species. Birds and squirrels became accustomed to the flash; as long as they didn't see us they would continue to feed, and we could take pictures as we pleased. The male cardinals were the only birds that never became tame enough for us to take the photos that we wanted.

It is never too soon or too late to start your backyard wildlife program. The cost for this rewarding winter pastime is minimal. And you may get a once-in-a-lifetime chance to photograph a rare species. ♦

Recon . . .

Land use law. New Hampshire's legislature has enacted a land use law to protect open space and wildlands. The new act will shield such lands by providing for assessment at the value of present usage. Under the former state law, land could be assessed at its potential development value.

Save on fuel and labor. Farmers can realize a double savings—on fuel and labor—if they opt for some form of reduced tillage when planting their crops. And the savings can be considerable. USDA engineers calculate farmers can just about cut their fuel needs in half and their labor needs by 40 percent if they practice reduced tillage (which skips plowing, disking, and harrowing) or minimum tillage (which uses a till planter). No-till systems are even more economical where soil conditions permit their use. Savings can amount to as much as 80 percent on fuel and 60 percent on labor.

Michigan has enacted a property tax exemption for seawalls or jetties built to stop erosion on the Great Lakes shore.

It's happening everywhere. Many people might look at North Dakota's wide open spaces and thin population and conclude that land use planning and zoning aren't necessary there. Much land in North Dakota is agricultural and will probably remain in farms, but some areas of the state can expect shifts in land uses, making planning and zoning valuable if not essential, according to Elmer Vangsness, extension resource development economist at North Dakota State University.

The Ford Foundation has awarded 10 grants totaling $13,710 to help local conservation commissions establish programs to deal with a variety of environmental problems affecting their communities. Grants ranging from $750 to $2,110 were awarded to commissions in the following communities: Amherst, N.H.; Binghamton, N.Y.; Caroga Lake, N.Y.; Egg Harbor Township, N.J.; Hampton Falls, N.H.; Hamptonburgh, N.Y.; Oneonta, N.Y.; Pohatcong, N.J.; Shirley, Mass.; and Windham, N.H.

International efforts to protect wildlife in underdeveloped nations have been established as Rare Animal Relief Effort (RARE). Early projects include preservation of rain forests in Puerto Rico and pressure on nations to limit whaling to International Whaling Commission quotas.

Under the Federal Environmental Pesticide Act of 1972, pesticides are classified in two categories, restricted use and general use. General use pesticides will not usually cause adverse effects on the environment or injury to the applicator. No certification is necessary for the application of this class. Restricted use pesticides may cause adverse effects on the environment or injury to the applicator. Certification will be required for the application of these pesticides when the law takes effect in 1976.

Law takes the worry from wildlife. Federal protection of endangered wildlife became law during the twilight hours of the 1973 Congressional session. The new law requires states to set up programs protecting species in danger of extinction. It authorizes funds and outlines beginning procedures. If a state has not completed a program within 15 months, the Department of the Interior can preempt the state and take over protection of its endangered wildlife. Another important feature of the bill is that it sets forth two types of lists—one now covering endangered species and a new list enumerating threatened species.

State's stake in conservation. Iowa's cost-sharing program for permanent conservation practices has been very successful in its first year of operation, reported Wilson T. Moon, SCS State Conservationist for Iowa. In the first 6 months, more than 2,000 requests were received, of which 1,420 were approved for assistance. The approvals include 920 terraces, 125 diversions, 105 waterways, and 150 grade stabilization structures.

Recycling—raw materials vs. energy. Recycling of materials is one way of conserving raw resources for future use. Unfortunately, according to a Stanford University Ecology House report, recycling may be a classic case of an environmental trade-off. Recycling may conserve raw materials, but it uses energy—more energy than possibly would be needed to make a new product. In short, by recycling, we save raw materials but spend energy.

Review

Threatened Wildlife of the United States. *1973. U.S. Dept. of the Interior, Bureau of Sport Fisheries and Wildlife, Resource Pub. 114. 289 pp.* Presents data on the status of species or subspecies of vertebrates whose existence is threatened in the United States, including the Virgin Islands and Puerto Rico. Two previous editions of this publication differ from this third edition in that "threatened" has been substituted for the designations "rare" and "endangered." This change was made primarily to emphasize that the listing in this publication is not the official list of "endangered" species. That list, compiled by USDI, is published in the *Federal Register.* It includes 109 species and subspecies of fish and wildlife—31 fishes, 8 reptiles and amphibians, 53 birds, and 17 mammals. Addresses of state conservation agencies are given in an appendix, and a state-by-state listing of endangered species is also included.

Beef Cattle Production Potential of Set-Aside Land. *1973. Economic Research Service-USDA (ERS-532). 44 pp., tables and maps.* This report summarizes research conducted by ERS on set-aside land on sample farms with beef cows, the effects of alternative set-aside provisions, feeder cattle production on set-aside land, and potential changes in set-aside program payment rates. Approximately 449 counties were included in the 23 study subregions; 1,169 farmers were interviewed by the ERS task force.

Linear Theory of Hydrologic Systems. By James C. I. Dooge. *1973. USDA Tech. Bull. 1468. 327 pp., illus. with graphs and charts.* Hydrologic systems are basic to computations for successfully planning the best use of soil and water resources in agricultural watersheds. This publication discusses the general principles of the linear theory of deterministic hydrologic systems. The author is a world authority on the subject.

Planning For An Individual Water System. 1973. American Association For Vocational Instructional Materials (AAVIM), in cooperation with the Agricultural Research Service and Environmental Protection Agency (Water Programs Branch). (AAVIM, Engineering Center, Athens, Georgia 30602.) 156 pp., illus. $6.75. This book tells how to plan for a safe and adequate water supply. It was developed for the person who has the responsibility of providing a water system for a suburban home, vacation home, farm or ranch. It can be helpful to a person engaged in developing water sources such as wells, cisterns, and small lakes for domestic water supply. The information is basic, and the format is simplified for easy learning.

Meetings

April

1–2 *American Pulpwood Association, Atlanta, Ga.*
1–2 *Wildlife Society, Denver, Colo.*
2–6 *Association of Interpretive Naturalists, Inc., Asilomar Beach, Calif.*
3–5 *Twelfth Annual Symposium on Engineering Geology and Soils Engineering, Boise, Idaho*
3–6 *National Rivers and Harbors Conference, Washington, D.C.*
8–12 *American Geophysical Union, Washington, D.C.*
9–11 *Identification and Transformation of Aquatic Pollutants Symposium, Athens, Ga.*
21–24 *National Water Safety Congress, Charleston, W. Va.*
22–24 *National Academy of Sciences, Washington, D.C.*
24–26 *Hardwood Plywood Manufacturers Association, New Orleans, La.*
26–28 *The Nature Conservancy, Washington, D.C.*
28–30 *Chamber of Commerce of the United States, Washington, D.C.*
28–May 1 *Association of American Geographers, Seattle, Wash.*

May

2–3 *California Fertilizer Conference, Anaheim, Calif.*
5–8 *National Forest Products Association, Washington, D.C.*
12–16 *National Council of State Garden Clubs, Inc., Boston, Mass.*
19–25 *Soil Stewardship Week*
20–23 *American Institute of Architects, Washington, D.C.*

June

16–19 *National Watershed Congress, Pittsburgh, Pa.*
23–26 *American Society of Agricultural Engineers, Stillwater, Okla.*
23–27 *National Environmental Health Association, Cincinnati, Ohio*
24–28 *American Society of Civil Engineers National Symposium on Water Quality Planning, Ithaca, N.Y.*
24–28 *American Society for Testing and Materials, Washington, D.C.*

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D. C. 20401

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300
AGR 101



POSTAGE AND FEES PAID
U. S. GOVERNMENT PRINTING OFFICE

MOVING? Send present mailing label and new address, including zip code, to Division of Public Documents, U.S. Government Printing Office, Washington, D.C. 20401.

Soil surveys

Alaska

Salcha-Big Delta Area. By Dale B. Schoephorster. *1973. Soil Conservation Service in cooperation with University of Alaska Institute of Agricultural Sciences. 51 pp., illus.; maps.*

Susitna Valley Area. By Dale B. Schoephorster and Robert B. Hinton. *1973. Soil Conservation Service in cooperation with University of Alaska Institute of Agricultural Sciences. 71 pp., illus.; maps.*

California

San Diego Area. (San Diego County excluding the Anza-Borrego and Cuyamaca State Parks) Part I and Part II. By Roy H. Bowman, Ralph E. Bishop, Roy W. Griffin, Marvin L. Jones, the County of San Diego Planning Department and the Comprehensive Planning Organization. *1973. Soil Conservation Service and Forest Service in cooperation with University of California Agricultural Experiment Station, U.S. Department of the Interior, Bureau of Indian Affairs, Department of the Navy, U.S. Marine Corps. 104 and 118 pp. respectively, illus.; maps.*

Colorado

Alamosa Area. By James P. Pannell, James M. Yenter, Stanley O. Woodyard, and Richard E. Mayhugh. *1973. Soil Conservation Service in cooperation with Colorado Agricultural Experiment Station. 122 pp., illus.; maps.*

Baca County. By Stanley O. Woodyard, Rodney E. Preator, Ronald E. Moreland, and M. Bruce McCullough. *1973. Soil Conservation Service and Forest Service in cooperation with Colorado Agricultural Experiment Station. 55 pp., illus.; maps.*

Georgia

Berrien and Lanier Counties. By Joe G. Stevens. *1973. Soil Conservation Service in cooperation with University of Georgia, College of Agriculture, Agricultural Experiment Stations. 66 pp., illus.; maps.*

Cobb County. By Grover J. Thomas, Jr. *1973. Soil Conservation Service in cooperation with University of Georgia, College of Agriculture, Agricultural Experiment Stations. 70 pp., illus.; maps.*

Idaho

Bingham County. By Richard A. Salzmann and Jack O. Harwood. *1973. Soil Conservation Service in cooperation with University of Idaho, Idaho Agricultural Experiment Station. 123 pp., illus.; maps.*

Kansas

Crawford County. By Donald E. Rott, Deane W. Swanson, and George N. Jorgensen, Jr. *1973. Soil Conservation Service in cooperation with Kansas Agricultural Experiment Station. 50 pp., illus.; maps.*

Hodgeman County. By Roger Lee Haberman, Darold A. Dodge, and John Bradley Baumann. *1973. Soil Conservation Service in cooperation with Kansas Agricultural Experiment Station. 56 pp., illus.; maps.*

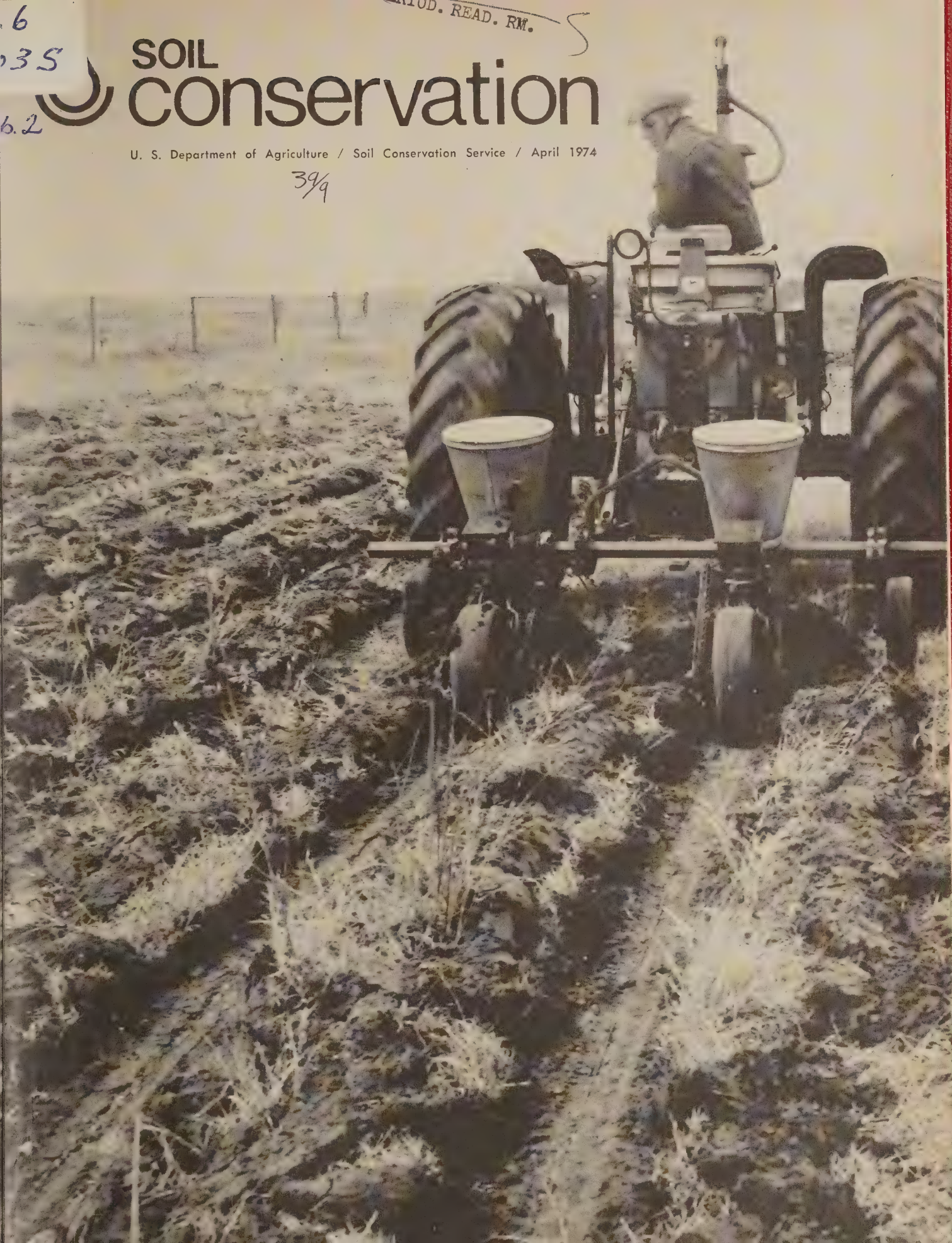
.6
035
6.2

PERIOD. READ. RM.

SOIL conservation

U. S. Department of Agriculture / Soil Conservation Service / April 1974

39/9



Preserving prime farmland

American farmers may have increased planted acreage of major crops an estimated 5 percent this year, putting more land into crops than they have in 18 years. Some of the acres coming back into production could prove marginal for farming.

Why use marginal farmland? One reason is that demand for agricultural products encourages farmers to plant more acreage. Another is that, in some areas, farmers are being squeezed out of using the better agricultural lands by urban expansion. A third, and related, reason is the high cost of land—farm real estate values rose an average of 21 percent across the country in 1973.

Reconciling competing land uses in the urban-agricultural fringe areas is a difficult problem. The problem becomes more complex because some of the best food and fiber producing areas in the United States are also extremely well suited for urban development.

Growing sufficient food for the nation's needs is a challenging task. We cannot, of course, add up available farm acreage, determine farm production demand, and then assign each crop the acreage it needs. Not all crops grow on all soils. Many crops, including many fruits and vegetables, are often very restricted in their range of adaptation.

For example, red tart cherries grow well only in a limited area. One of the best areas for these cherries is Grand Traverse County, Michigan. But many of the best sites for cherry orchards could also be developed into homesites, roads and shopping centers.

The Soil Conservation Service recently published a Red Tart Cherry Site Inventory for Grand Traverse County. This will provide community planners with an opportunity to recognize the special values of their land. Hopefully, it may help to keep a majority of the better sites for orchards.

There are similar examples of land especially suited to certain crops, from the avocado orchards of southern California to some citrus growing counties of Florida. Land planners should be aware of the fact that when prime or unique crop-growing areas are destroyed or converted, they are generally gone from food production for good. Finding suitable replacement areas may be difficult and costly.

The Secretary of Agriculture, in a statement on land-use policy, has said that the Department will "adapt present programs to help enhance and preserve prime agricultural, range, and forest lands for these uses." We can do this through providing towns, cities, counties, and states with natural resource information and with assistance in implementing desirable land use plans.

The preservation of prime and unique farmlands should be a vital part of present and future land use planning. Both farmers and city and suburban dwellers will benefit. We all eat, and we all need a place to live.

Kenneth E. Grant

SOIL conservation

April 1974, Vol. 39, No. 9

Contents

2 From the Administrator

4 Full Production with Conservation
Excerpts from speech by Secretary of Agriculture

6 A family sticks to the land
by Gene Warren

8 Why Natural Areas are Important
by John Humke

10 ". . . not a hatful of grass"
by Eph I. Cummins

11 Conservation goes to college
by Lynn Betts

12 Produce More Protect More

14 Flagstone industry thrives again
by Jerome C. Hytry

16 Living space for Colorado's elk
by Bob Saile

17 Feedlot runoff under control
by Willie Y. Reece

18 Windbreaks for beefsteaks
by John M. Cross

20 NACD Recreation Inventory
by Charles G. Phillips

21 No-Till Stands Tall
by Paul R. Britt

22 Soil surveys

23 Meetings

24 Recon

COVER: Range interseeding in Nebraska.

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

EARL L. BUTZ, Secretary of Agriculture.

KENNETH E. GRANT, Administrator, Soil Conservation Service

MARYELLEN BERTRAM, Editorial Assistant

SOIL CONSERVATION, the official magazine of the Soil Conservation Service, is published monthly by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. Use of funds for printing this publication approved by the Director of the Office of Management and Budget, July 17, 1973.

Reprint permission: Contents of this magazine may be reprinted without permission. Credit is not required but is appreciated. Photographs are available on request.

Commercial names: Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscription: $5.65 per year, $7.10 foreign. Single copy, 50 cents. Discount of 25 percent on orders of 100 or more sent to same address. Order direct from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Full Production with Conservation



Excerpts from the speech
by Secretary of Agriculture
Earl L. Butz
at the 1974 Annual Convention
of the National Association
of Conservation Districts

We're in a new ball game in agriculture.

After nearly half a century of chronic surpluses, we now face the need for all-out production.

Our agricultural policy has changed directions. Today we have turned 180 degrees from where we were headed only a few years ago.

For decades, our official farm policy was based on the philosophy of restrictions, of cutbacks, of allotments and quotas.

During those years it was easy to sell a national philosophy of conservation. Conservation farming, grass farming, and retirement of marginal areas into less exploitive uses were popular with the public. With Federal incentives of cost sharing and technical assistance in an era of surplus production, they were also popular with farmers.

The public, Congress, consumers, and foreign buyers of agricultural commodities accepted this philosophy, even when it meant retiring substantial areas of cropland from production, whether on an annual basis or for a longer term. Very few were concerned about inadequate supplies of food, or even about the price of food.

Now the situation has changed.

Food prices make headlines today—both at home and abroad.

A growing number of people, including many politicians, are asking if maybe we have gone overboard in conservation. They look askance at vast acreages which have been set aside for conservation purposes, not only for parks and open space, but sometimes to control agricultural production, often at considerable public expense. These concerned individuals and groups rightly raise the question whether the Federal Government should be involved in programs of this kind. . . .

Let me state categorically that there should be no conflict between full production and sound conservation . . . Every true conservationist, as well as every true economist, knows that sound conservation and full production go hand-in-hand. They are complementary. One serves the other.

We are fortunate in our current need for full production that American farmers have followed good conservation practices in past years. Our agricultural plant is ready to respond fully to the need of the times. It will respond even more fully in the years ahead if we continue to farm with sound conservation as the baseline of our production methods.

This means putting each class of land to its highest use. If land is not suitable for heavy tillage, it should not be put to the plow. You may be able to mine such land, and take a short-term profit. But in the long run, the capacity to produce is dissipated, and our entire national economy is the poorer for it.

For some areas, grass is the highest use, yielding the greatest long-term benefits to the

landowner and to society. For other areas, limited cultivation is indicated. In some areas, contour farming, stripcropping, and rotation planting are the conservation tools required to attain the highest use of farmland. For some areas, the highest use is continuous cropping. And for some areas, it is not cropping at all, but rather forestry or recreation which is the highest use.

We have made studies to watch for possible trouble spots in the months ahead. We have found areas which cause concern. The most serious is in the High Plains area of western Texas and Oklahoma and eastern New Mexico, where unprotected land and a lack of rainfall have combined to cause wind erosion damage to hundreds of thousands of acres this winter. And U.S. Department of Agriculture field offices throughout the country predict that nearly half of the additional cropland being brought back into production in 1974 will be subject to severe erosion from wind and water. This new cropland needs to be protected by adequate conservation measures as quickly as possible.

Our current program to "produce more, protect more" is specifically geared to help farmers and ranchers do just that. USDA agencies and conservation districts are pledged to work together toward this end. It is an effort that is needed not only for this year, but for next year, and for the next generation, and for the one after that. We must encourage and support land use that maintains the quality and the productivity of America's agricultural lands.

The National Association of Conservation Districts and member associations face broad challenges to assume leadership in working for a better informed, enlightened electorate so that wise decisions can be made in land use planning.

You are working with a tremendous reservoir of public concern and good will. The recent PACER national survey shows that 43 percent of the people are afraid that we will have food shortages in 10 years; and 96 percent believe that land should be preserved for food production.

People also think that you can do the conservation job. More than half think that farmers are both more concerned about the environment than the average person and do more about it.

In every state, conservation districts have at their disposal information, inventories, plans, cooperative working relationships, and expertise dealing directly with the natural resources aspects of land use planning.

As subdivisions of state government, with legal responsibilities and authorities, conservation districts are generally in a better position than almost any other public or private group to assist individual farmers and local and state governments in developing and carrying out land use plans. You can help them get and use available soil survey information to assure wise decisions and allocation of land resources.

A concerned public looks to local conservation districts and USDA technicians to help farmers develop plans and install proper erosion control methods as a part of their normal farming operation. Again, consumers are increasingly aware that conservation and production are not incompatible. They go together. . . .

We must urge farmers to use modern soil-protecting tillage practices, such as minimum tillage or no-till, where possible. This will save fuel, too.

They should be encouraged to protect rangeland from overuse and use pasture management systems tailored to individual farm resources.

They should be encouraged to apply conservation techniques to irrigation practices, making sure that water drawdown will not seriously affect the water table.

They should be encouraged to leave land unsuitable for intensive use in grass or trees.

Farmers in specific areas of concern should be encouraged to tailor their individual farm plans to prevent erosion due to careless land use, such as has occurred in the past. For example, in the southeastern states, where soil is subject to gullying; in the Great Plains, where wind erosion is a constant problem; and in the Palouse region of the Northwest, where rill erosion threatens soil resources—in these regions, Soil Conservation Service field people will be vigilant to recommend farm plans that safeguard against a repeat of earlier tragedies.

America's farmers are the original conservationists. They are our best environmentalists. They are custodians of the gifts of nature. They live close to the soil, and they love it. They live with the seasons—with the air, and water, and the biological processes. They understand and respect them.

Farmers are willing partners with conservation districts and with the Extension Service. They are willing users of techniques and programs that result in the fruitful marriage of production for profit and wise land use for posterity.

continued on p. 22



Cane farming represents "the good life" to Louisiana's Sigue family. (Left to right) Roland, Warren, Joseph, Sr., Donald, Joseph, Jr., and Lurry.

A family sticks to the land

Sad to say, it isn't news when five sons leave the family farm for the city.

But this is the story of five sons who stayed on their Louisiana farm and, even more astonishing, found a way to run it without getting in each other's hair.

And conservation has helped them make a success of it.

The five Sigue brothers farm some 2,400 acres in Iberia Parish, about half of it in sugarcane. The family owns 250 acres; the rest is on long-term lease.

The father, Joseph Sigue, who is semiretired, is pleased that his boys decided to follow in his footsteps.

"But cane farming is sure different from when I started in 1918," recalls Joseph. "I was 18 then, and my brother and I farmed 150 acres of cane near here, with two teams of mules. The land was rough and yields ran about 15 tons per acre.

"Today my boys are getting at least twice as much—from 30 to 34 tons per acre."

The Sigues turned in their mules for a tractor in 1941. A combination of hard work and careful management has made their farm a top producer today, with fields tilled and tended by 15 tractors, 3 harvesters, and an assortment of dozers, draglines, loaders, and other equipment.

How do the boys divide the work—and the responsibility?

"I am the overall adminis-

trator since Dad decided to take it easier," reports brother Donald. "Warren takes care of the mechanical work, Lurry and Joseph keep the dozers working and the field action going, and Roland looks after our 70 head of cattle, and drives the bus to our community school. Each of us knows exactly what his duties are, and that keeps arguments to a minimum."

The leased land is scattered in several tracts over the parish.

"The landowners let us make what improvements are necessary, and we pay a percentage of the crop yields," Donald says. "The more productive the land, the better the profits for all of us."

He says that the family's production goal is an average of 35 tons per acre.

"When we reach that magic number, we're going to settle down to 1,100 acres of cane. More acreage means more equipment, labor, and expense. Better yields on fewer acres is the answer to success in cane farming."

The Sigues are top conservation farmers and say this has contributed to good, consistent yields. Joseph Sigue, Sr., was an early cooperator with the Iberia-Vermilion Soil and Water Conservation District. It has been nearly 20 years since he first asked the Soil Conservation Service in New Iberia to help him develop a conservation plan.

"As he and his sons acquired more land, they called on us to look it over and assist in planning conservation practices," according to Dolan Kleinpeter, SCS district conservationist.

The Sigues swear by practices such as water management, land leveling, sugarcane residue management, proper fertilization, and deep-plowing.

"Land leveling and water management help in the planting, harvesting, and working of fields," says Lurry Sigue. "It also helps in proper row direction and eliminating unnecessary split and quarter drains that take up land and serve as seedbeds for Johnsongrass.

"We plow about 18 inches deep before planting cane in early summer. We used to deep-plow in the middle of rows and bed over it. Now we make the beds and run the subsoil plow through the top of the beds. Cane is laid in these modified plowed furrows, and this eliminates one plowing."

The Sigue team say deep-plowing allows cane roots to penetrate the soil better and that moisture soaks through hardpans when they are broken by the plow.

The Sigues credit other factors with helping to keep yields high—among them, better varieties of cane and fertilizers.

"We have a new system of heat treating our planting cane stock that helps keep diseases to a minimum," reports Donald. "Farmers bring their cane to the oven at the local co-op before planting and leave it for 8 hours at about 160 degrees. This just about eliminates ratoon stunting disease and the cane comes up faster and grows off better before frost."

The Sigues recently began another profitable practice. "We now haul harvested cane directly to the mill in our carts instead of unloading it and reloading it onto trucks," says Joseph, Jr. "This saves the labor of several men and a lot of truck expense. Trucks are needed only for long hauls!"

The cattle operation on about 110 acres of their land is mostly for family beef. All six families, a total of 36 people, eat beef from the herd.

"We also have hogs for family pork," says Roland Sigue. "When we run low on beef or pork, we slaughter and divide it into six portions. Warren has the largest family so he gets the most."

Joseph Sigue says it pretty well. "The greatest satisfaction a father can have is for a son to follow in his footsteps. When you have five that do it, it is more than a man deserves." ♦

by Gene Warren
Public information specialist, SCS
Alexandria, Louisiana



Why Natural Areas are Important

by John Humke
Vice President
The Nature Conservancy

A lot of people still think of natural areas as a place where bird watchers and nature nuts go to do their thing on Sunday afternoons. This is true. And, frequently, I'm with them because I'm both a bird watcher and a nature nut. However, natural area preservation is actually undertaken for more important reasons.

In the broadest sense it is an effort to control unplanned, unnecessary, and potentially dangerous landscape destruction. We think of this in terms of "ecosystem preservation."

The ecological components of this world we live in, and particularly the biological species, exist in restricted geographic areas where they have adapted to or have evolved under certain physical conditions. They live in association with other organisms in complex arrangements called ecosystems.

The primary objective of ecosystem preservation is to maintain the full diversity of species that exist in a geographical area and the ecological relationships that exist between them and the rest of their environment.

There are several important reasons for doing this. Each species is a unique biochemical entity containing its own genetic code. That is, each species contains its portion of the diversity of germ plasm available in the world and with each extinction the world is forever a poorer place. Each species plays a role in the maintenance of environmental stability. Science is constantly finding new uses for species ranging from lifesaving drugs to biological pest controls.

Ecosystem preserves are research sites for the discovery of ecological principles essential to the proper management of resources. They form the baselines against which the effects of man on his environment can be measured. When man so drastically alters an environment that it collapses as a livable habitat, it would perhaps be impossible to rehabilitate that environment if scientists could not go back to the original conditions and reconstruct what went wrong.

Another way to think about the importance of preserving ecological diversity is to reflect upon the words of Aldo Leopold to the effect that "the first step to intelligent tinkering is saving all the pieces."

The Nature Conservancy's concern for ecological diversity and the creation of nature preserves goes back over 55 years, to 1917, when the Ecological Society of America created the Committee for the Preservation of Natural Conditions. This committee ultimately became The Nature Conservancy. Its primary objective is natural area preservation. The primary technique for doing this is land acquisition.

During its lifetime the organization has been responsible for the protection of over 1,100 natural areas involving over 600,000 acres. Natural area projects range in size and type from a 230,000-acre desert research site in New Mexico to a ¼-acre salt marsh in Connecticut.

For the first 20 years, the Conservancy put virtually its entire resources into the task of acquiring endangered natural areas, with the idea that full management of these areas would have to wait until the pressure was off. The pressures on land are not lessening and we are a long way from protecting all natural areas worthy of protection.

As we acquired land, we frequently deeded out or leased areas to government agencies, universities, and sister conservation organizations where it was the best way to get good management. However, The Nature Conservancy also kept many areas, to the point where we presently hold direct management responsibility for over



Devil's Den, Connecticut. The dam was damaged.



Patagonia-Sonoita Creek, Arizona. For the birds.

450 areas around the country.

Back in late 1970 some conversations between our office, the Soil Conservation Service, and the National Association of Conservation Districts led to a pilot experiment in cooperation on natural area inventory and management planning. In 1972, SCS Administrator Kenneth E. Grant issued Environmental Memorandum-13, "Natural Areas Policy and Procedure," which stated that the Soil Conservation Service would recognize natural areas, when so dedicated, as qualified to receive SCS technical assistance. The SCS memorandum also stated that technical assistance would be furnished to representatives of administering agencies, foundations and groups, and to individuals, when requested through soil conservation districts.

SCS employees would report any potential or actual damages to natural areas they found in the course of their ordinary business.

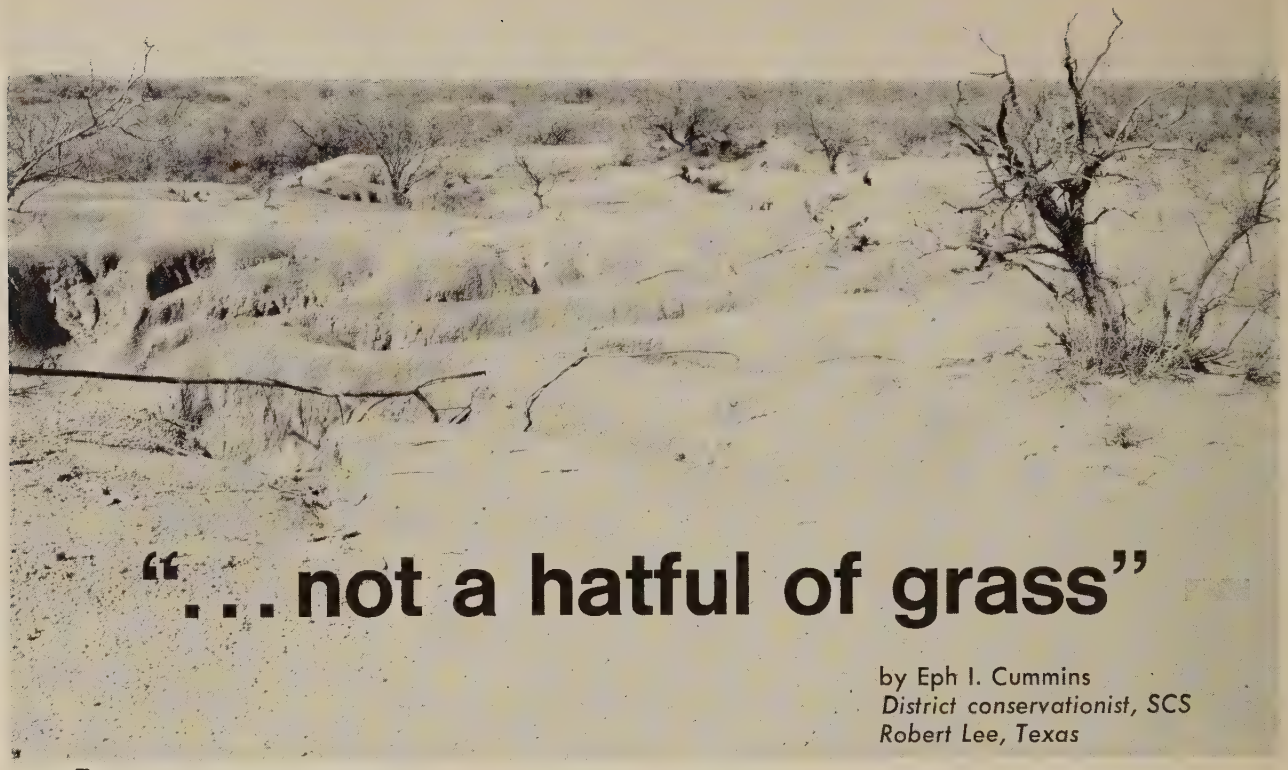
SCS would cooperate with interested societies, groups, or individuals in locating suitable natural areas.

SCS plant scientists and others might become involved in providing technical assistance on some natural areas due to their special nature or purpose.

When providing land operators with regular technical assistance, SCS people would also inform them of any impact their decisions may have on nearby natural areas.

With this environmental memorandum as the key, we worked further with SCS and the National Association of Conservation Districts in developing a program. A brief description of assistance available from SCS through conservation districts was sent to our people

continued on p. 22



"...not a hatful of grass"

by Eph I. Cummins
District conservationist, SCS
Robert Lee, Texas

If there was ever a test of range reclamation, it was the 80 acres of eroded gullies on the 660-acre Mary Jane Adams ranch southeast of Robert Lee, Texas, not far from San Angelo.

The topsoil was gone and the area was contributing lots of sediment to streams and lakes. There was little forage; about the only things growing were mesquite and tasajillo.

As one observer remarked, "There's not a hatful of grass on the whole 80 acres."

Then Bob and Mary Jane Adams asked the Coke County Soil and Water Conservation District to help them develop a plan for their ranch. SCS specialists worked with them in analyzing their goals and in figuring out alternatives, using the soil survey as a guide. An inventory of forage production enabled the couple to compare current forage production with the production potential of various sites on the ranch. The inventory showed that improvement of vegetative cover was needed over most of the ranch, along with mesquite control. But the toughest single problem was the 80-acre tract of gullied land.

Restoration began in 1970. Dozers were used to fill the gullies and flatten the slopes to reduce the hazard of erosion. A seedbed was prepared by rootplowing. This broke up the tight and compacted soil and enabled rainfall to penetrate the soil.

The seedbed was modified with a roller chopper and seeded to a mixture of sideoats grama, KR bluestem, sand lovegrass, green sprangletop, switchgrass, and indiangrass.

The first seeding was unsuccessful; the summer of 1970 was extremely hot and dry. The land was reseeded in 1971, and the grasses came up and had two full growing seasons of rest. Mary Jane says, "The deferments gave the grass plants a chance to become established and produce a seed crop."

Species such as sideoats grama, green sprangletop, indiangrass, and sand lovegrass are growing from knee to waist-high, producing excellent forage for livestock. The soil is being kept productive and stable. Erosion is being controlled and the water resources downstream have less pollution from siltation and sediment.

J. L. Brunson, who has known the place for many years, says, "The grass production on the ranch has increased four to five times since the program was started 3 years ago."

Sixty cows were run on the ranch in the winter of 1972-73. It has been rested during the 1973 growing season. Mary Jane said, "Prior to doing the conservation work, I could have run from 10 to 15 cows on the whole place."

The steeper and shallower land was left in brush as hab-

itat for wildlife. Some of the seeded grasses furnish food and cover for deer, quail, and dove.

A planned grazing system on the several pastures will help in grassland and livestock management. During times of drought and low forage production, livestock will be reduced in order to keep grazing pressure in balance with grass production. ♦



Severe erosion has removed topsoil and all vegetative cover on picture at left. (Right) Mary Jane Adams examines indiangrass seedheads in an excellent stand of grass. Other grasses are sideoats grama, green sprangletop, KR bluestem and blue panic.

Conservation goes to college

by Lynn Betts
Information specialist, SCS
Des Moines, Iowa

Outdoor classrooms are for kids, right? Not quite, say a number of Iowa colleges which have developed outdoor learning centers on their campuses. They feel it's important to provide this kind of education at higher levels as well.

One of the most extensively developed outdoor learning centers is at North Iowa Area Community College (NIACC). It covers 135 acres of the college's 310-acre campus just outside Mason City.

Heaviest use of the area by NIACC's 1,500 students has been for classes in biology, agriculture, business, and art. The classroom also is open to grade school students and community groups.

North Iowa's outdoor learning site was started 4 years ago when Larry Heaton, district conservationist with the Soil Conservation Service, suggested the idea to Dean Nerdig, NIACC agricultural business instructor. A conservation plan was subsequently developed that included a pond, a grassed waterway, nearly a mile of parallel tile-outlet terraces, and diversion terraces for agricultural and water quality studies.

Students studying farm operations practice good resource management on the 68 acres of cropland. They stripcrop fields, use conservation tillage on row crops, and seed terrace backslopes with various grasses to demonstrate the capabilities for erosion control and beautification.

A 22-acre grassland area on the site will not be disturbed, except for a few shrub and tree clump plantings. The area is used to study ground-burrowing animals, ground-nesting birds, and other types of wildlife. A 1-acre pond, used for aquatic studies, has been stocked with fingerling bass and catfish.

In addition, a field windbreak was planted last spring, a 12-acre wildlife area has been developed, and a 13-acre woodland area has been set up for woodland management studies. ♦

PRODUCE MORE
PROTECT MORE

...a challenge to the American f



farmer



THE AMERICAN MAINLAND

stretches 3,000 miles wide, 1,500 miles north and south. On a very significant amount of this land, farmers and ranchers are:

—Producing more wheat, corn, grain sorghum and other agricultural products needed in 1974, and

—Protecting more land to keep it fertile for the next year—and the next generation.

As millions of acres of "new" land go into crop production, and as present cropland receives intensified use, production with protection becomes more important than ever.

The farmer has a responsibility to use his soil wisely—and he knows it. Soil Conservation Service people stand ready with technical help. They make these recommendations:

Farm land under a conservation plan.

Plant the right crops in the right soil.

Use effective soil and water conservation techniques, including minimum or no tillage where possible.

Keep steep land or other areas highly susceptible to erosion covered by grass or trees.

Locally-based SCS men help farmers to tailor these general recommendations into specific conservation plans. The nation's economy and ecology—and its people—all benefit.

Flagstone industry thrives again

by Jerome C. Hytry
Assistant state conservationist, SCS
Somerset, New Jersey



Bluestone quarry on the Wildred Smith farm.

Hidden in the rural farmland of northeastern Pennsylvania, a productive and interesting natural resource industry had almost faded into history. Now, thanks to an organized grassroots movement, it's a thriving business again and the second biggest money earner in the area.

Deposits of bluestone were found about 100 years ago in Susquehanna County near the northern border of Pennsylvania. Over 300 million years old, they had been pressured into flat, even layers. Farmers plowing their fields uncovered the deposits and found the flagstone easy to quarry and use for sidewalks and curbstones. Susquehanna County alone once boasted over 300 quarries, employing more than 1,500 men.

As years passed, the demand for the flagstone declined and less expensive materials took over the market. By 1965, only 75 quarries employing less than 250 men were operating.

Today, the once-doomed industry has a bright future. The turnabout began with a program of the Endless Mountains Resource Conservation and Development Project. This locally initiated and sponsored project, covering five northeast Pennsylvania counties, is assisted by agencies of the U.S. Department of Agriculture under the leadership of the Soil Conservation Service. Local people plan the project work, set priorities, and receive financial and technical aid from various federal and state agencies.

HOW THEY DID IT

Reviving the flagstone industry seemed like a futile effort when RC&D project sponsors began in 1968. One unsuccessful attempt by another group

had already been made in 1963. But Carlton Birchard, an RC&D executive council member, had been a quarryman, and his viewpoint was "nothing ventured, nothing gained."

Birchard, Robert Shaw, and other quarry owners discovered they had a number of common problems.

First, each quarryman operated independently. He did his own prospecting, quarrying, and marketing.

Second, there was no feasible method of locating flagstone deposits. The quarrymen had little or no idea how much stone was at any location.

Third, there were no standards or specifications for flagstone.

Fourth, there was no advertising or promotion of flagstone. Each quarryman had his own "buyer" or "broker," and the price was negotiable.

Some sort of organization was necessary. With the help of Edward Dieffenbach, Susquehanna County extension agent, the quarrymen formed a self-help committee. In January 1969, this became the Pennsylvania Bluestone Association and things began to happen.

In June 1969, the Bluestone Association entered into a contract with the Small Industries Research of Pennsylvania State University, to proceed with three research projects valued at $26,600. The local share was $2,660 with $23,940 being provided by the university.

The first research project was headed by Stephen Krajewski, a geology instructor from Washington and Jefferson College, Washington, Pennsylvania, and the first aim was to locate new flagstone deposits.

The next concern was to identify the physical and mechanical properties of the flagstone. The third part of the research project involved the marketing, physical distribution, and pricing of the bluestone.



Ken Morrison cuts bluestone with electric diamond studded saw. Morrison is president of the Pennsylvania Bluestone Association.

The researchers learned that bluestone deposits were almost always found under Lordstown soil, which covers about 30 percent of the county. Soils information previously prepared by the Soil Conservation Service made it relatively easy to locate this soil. Thus, depending on the amount of overburden on top of the bluestone, the researchers could pinpoint numerous potential quarry sites.

WORK AND WORKSHOPS

By June 1970, the Bluestone Association had enough information to sponsor two workshops. One covered land leases. The other concentrated on the use of dynamite; one result was that 26 quarrymen received blasting licenses. Interest grew, and so did the quarry industry.

Today, the quarry industry ranks second only to dairy farming in Susquehanna County. More than 100 quarry operators are members of the Bluestone Association and they are cooperating in pricing, marketing, and shipping flagstone.

New markets are being researched and flagstone has even been put into use as a base for area roads. One ingenious couple, Cortland and Mary Birchard of Birchardville, Pa., have built a good business by making a variety of small items from the scrap stone.

Recently, the association and RC&D sponsors convinced state highway officials to use local bluestone in constructing a new interstate highway rest stop in Susquehanna County. Low cost and the available sturdy building material was their winning argument.

Reviving the bluestone quarry industry in Pennsylvania is one of many projects of the Endless Mountains Resource Conservation and Development Project. The quarrymen of Susquehanna County are happy it was one of the first projects considered in their conservation development effort. ♦



Living space for Colorado's elk

by Bob Saile
Sport's editor, Denver Post
Denver, Colorado

In the early 1900's, the first elk arrived in the San Juan Basin of southwestern Colorado via narrow guage railroad. They had been trapped in Yellowstone Park, with sportsmen and Elks Club members footing the bill for their rail fare.

By the late sixties, the Colorado elk herd had grown until it outstripped the winter range available.

Art Gresh, conservation officer for the Colorado Division of Wildlife, stationed at Durango, said, "We were faced with reducing the size of the herd, paying more game-damage claims, or finding new winter range."

The Wildlife Division, with the cooperation of the Soil Conservation Service and other agencies, decided to follow the third course of action. As a starter, it purchased 3,819 acres west of Durango, and some 2,000 more acres of Bureau of Land Management land were established in the past 5 years as the Perins Peak Wildlife Management Area.

A total of $303,050, spent primarily by hunters, was used to acquire the state land. About three-fourths of it was in the form of federal money from taxes on arms and ammunition. The rest was state money from the sale of hunting licenses.

Today as many as 500 elk now winter on the management tract, which also holds deer, bear, and turkey. Had the land not been acquired, it probably would have been purchased by subdivision developers.

The Perins Peak property originally consisted of two ranches. One was purchased for $56 an acre, and the second went for $112.50.

"Today," Gresh reports, "the going price for land being subdivided in the area is $3,800 an acre."

Although the Perins Peak property was valuable enough in its original condition, quite a bit of the land had to be replanted and irrigated because of overgrazing.

The Soil Conservation Service played a key part in the replanting. Gene McGuire, SCS district conservationist, recommended the seeding of wheatgrass, bromegrass, alfalfa, and other plants. Tall oak brush was knocked down with chains to promote sprouting and easier browsing. McGuire designed a system of irrigation ditches.

Colorado State University, Fort Lewis College, and the U.S. Forest Service were active in the reforestation work. Further grazing leases were withheld from the BLM section of the management area.

The Division of Wildlife is currently seeking more winter range for the tract. Gresh says that several large ranchers have said they would rather sell to the state than to developers—even for less money—because they want the land preserved for wildlife and the public.

Today hunters take up to 700 head of elk annually out of the herd, about 100 of them from the Perins Peak area. Half of the total state elk harvest comes from the San Juan Basin, according to Gresh. ♦

Feedlot runoff under control

by Willie Y. Reece
District conservationist, SCS
Lubbock, Texas

Cleaner water for a city recreation project is one benefit of a feedlot pollution abatement system installed near Lubbock, Texas.

The 4,000-head feedlot, owned by Lubbock Christian College as an educational facility, is located 4 miles north of Lubbock. It is upstream from where the city eventually hopes to build an elaborate 1,500-acre Canyon Lakes Recreation Project to serve more than 200,000 people in the South Plains area.

Dr. Elton Cook, chairman of the Agriculture Department at Lubbock Christian College, said the potential for polluting the proposed lakes plus guidelines established by the Texas Water Quality Board were determining factors in building the $10,000 pollution abatement system.

The pollution control system includes two terraces and two holding ponds. One pond covers 1.1 acres and holds 5.24 acre-feet of feedlot waste. The second pond covers 0.8 acre and holds 1.81 acre-feet. The smaller pond drains 4.92 acres; the other drains 13.76 acres which is principally the feedlot itself.

The storage pits are capable of holding a 24-hour rain of 25-year frequency, which in Lubbock amounts to 5.3 inches of water in a 24-hour period—a very heavy rain. Pumping facilities and a sprinkler-irrigation system have been installed to spread the liquid waste on a nearby 100-acre bermudagrass pasture. The system is designed so the pits can be emptied within 2 weeks after they are filled. The water irrigates and fertilizes the pasture with excellent results.

To prevent contamination of underground water by seepage from the pits, the college had a private laboratory check the soils on the site before construction to determine if any could be used as a sealant. The laboratory found that the topsoil would work. It was stockpiled and spread 1 foot deep over the bottom and side slopes after construction.

When the job was finished, the Texas Water Quality Board's District Supervisor, Raymond L. Mittel of Lubbock, praised the college for solving a pollution problem. The Planning Department of the City of Lubbock also commended the college officials for good citizenship. Chairman Cook expressed appreciation to the Soil Conservation Service for technical assistance and to the Agricultural Stabilization and Conservation Service for sharing a portion of the cost. ♦



Runoff water from this Lubbock feedlot is diverted into holding ponds near top left of picture.

Windbreaks for beefsteaks

Cattle have their own energy crisis when winter storms come. But the crisis is lessened if they have windbreak protection. Sheltered by a row of tall trees, they burn up less feed trying to keep warm and spend more time eating and gaining weight.

"On a blustery day, cattle eat more behind the windbreak because they go to the bunks more often," is the way Bob Schmaderer sums it up. Schmaderer feeds 3,000-plus animals in Cuming County, the leading county in Nebraska in number of feedlots.

Some of his lots are beyond the end of his 5-row windbreaks, and he notices the cattle bunch up more out there on the unprotected side. Bunching up to keep warm, they spend less time eating and gain less in the same period.

Leland Olson agrees. "Without a windbreak, cattle get so cold they don't care to eat," Olson says. In 1960 Olson planted an 8-row windbreak on his farm near Oakland to protect the entire farmstead—home, outbuildings, cattle, machinery, and people.

Carlando Anderson, also near Oakland, remembers seeing horses, huddle together in a grove of trees and stay there 2 or 3 days without feed or water. He doesn't want his cattle to do the same thing, so he planted a windbreak for them. Anderson has been feeding cattle since "the day I started working," with and without windbreaks. "I'll choose the windbreak, that's for sure," he says.

Feedlot and farmstead windbreaks pay off in simple, easy to understand terms. The less amount of feed cattle use for heat energy production, the more beef they produce. The more cattle eat during the winter, the more they gain and the sooner they can go to the supermarket.

Cuming County farmers know this. That's why nearly every feedlot in the county is protected by a windbreak. Soil Conservation Service records show 2,065 acres of windbreaks protect the more than 720 feedlots. "Landowners plant about 35 to 40 acres of new windbreaks every year," says SCS District Conservationist Paul Smith. Much of the new planting is supplemental to older windbreaks that have lived out some of their usefulness and need evergreens to fill in.

Five species make up 95 percent of the trees planted. The usual pattern is two or three



by John M. Cross
Information specialist, SCS
Lincoln, Nebraska



District Conservationist Paul Smith examines a row of redcedars.

rows of eastern redcedar next to the north and west winds. Then two or more rows of either ponderosa pine or a mixture of green ash and honeylocust or hackberry.

Leland Olson's pine trees, though only 13 years old, are 18 feet tall. His cedars are 12 feet or more. No matter how bad the storm, he has no trouble with snowdrifts in the farmstead area. Snow between the first two rows of cedar will get as deep as the trees are tall, but little or none of it comes through. Fuel savings, from less snow removal, are important in these days of energy shortages.

Olson also has a row of honeysuckle inside his windbreak, which attracts wildlife. Pheasant and quail make homes there, and the blossoms add beauty and fragrance in the summer.

Bob Schmaderer likes to have pheasant overwinter in his windbreak, but they present one small problem: people shoot into them from the road at times.

Besides warmth and wildlife, windbreaks serve yet another purpose. Because they trap snow, there is less snowmelt in the feedlot, and the lots dry up sooner when the warm south winds sweep through.

But cold south winds are another story. The Andersons say they have to run their thermostat up 5° to maintain comfort in the house during a stormy south wind. When the winds shift back to north or west, where the windbreak does its work, the thermostat can be moved down again.

Windbreak planting in Cuming County follows a system. SCS conservationists assisting the Lower Elkhorn Natural Resources District help landowners plan for windbreaks as a part of conservation and land use planning. Orders for tree seedlings can be placed with SCS or the other agricultural agencies, and the resource district has the planters for hire.

Survival rates have been good, but it takes some doing. Young trees must be kept weed-free for the first 3 years. Olson had his tree rows set to the width of his disk, then hoed between the trees as long as necessary. Anderson bought a riding lawn mower to keep his rows clean. "The trees are worth the trouble," he says.

How much is a windbreak really worth? "You couldn't put a high enough price on it," thinks Leland Olson.

A number of landowners say it's best to leave plenty of room between trees and feedlots. The larger space traps more snow and allows space for doing chores and storing machinery where there's some protection. "Windbreaks make it a lot warmer for me, too," is the way Bob Schmaderer puts it.

April is tree planting time in Nebraska. This year, a lot of people are looking at the comfort, beauty, and energy and moneysaving benefits from farmstead and feedlot windbreaks. ♦

NACD Recreation Inventory

Public demand for outdoor recreation is rapidly growing. Increasingly, this demand will have to be met by the use of privately-owned recreation facilities.

Where are these facilities? And what kinds of recreation do they supply? Information on this is needed by conservation districts, other local units of government, the Soil Conservation Service, the Bureau of Outdoor Recreation (BOR), and other agencies and organizations that help to plan for recreational development. Data on public facilities are already available in most states.

COOPERATIVE AND COMPLETE

In October 1972, the National Association of Conservation Districts' Recreation and Natural Environment Committee proposed that the nation's conservation districts be instrumental in carrying out an inventory of private and semiprivate recreation facilities. After approval by the NACD Board of Directors, the committee met with appropriate BOR and SCS officials to develop preliminary plans. The NACD Board of Directors approved the plans in late 1973 and underwrote the funds required to print coding forms and instructions.

The inventory of private and semiprivate recreation facilities will be made on a county-by-county basis, and aims to achieve 100-percent coverage. The Bureau of Outdoor Recreation will compile the information into computerized national, state, and county summaries by use of an automatic data processing scanner.

The recreation facilities to be inventoried will include campgrounds, field sports areas, fishing waters, golf facilities, historic and archaeological sites, hunting areas, natural and scenic areas, picnic grounds, shooting preserves, snow ski areas, trails, vacation farms and ranches, water sports areas, and facilities used for rodeos, zoos, amusement parks, and outdoor theaters.

The inventory will include information on acreage devoted to recreation facilities, the number of guests, and other measurements of capacity such as the number of holes in a golf course or the number of vehicle and tent sites in a campground.

The energy shortage adds a new urgency to the inventory. With more leisure time—but less gasoline—more people than ever will be seeking recreation near their own home.

Conservation District Association presidents have been asked to provide leadership in conducting the inventory in their states. Representatives of agencies interested in outdoor recreation have been asked to serve as members of their state coordinating committee.

State coordinating committees have the option of adding special recreation facilities important within their state that are not included in the nationwide inventory. However, these facilities will not be included in the ADP scanning forms and thus will not be part of the national summary.—By CHARLES G. PHILLIPS, *Resource Conservation Planning Branch, SCS, Washington, D.C.* ♦



No-Till Stands Tall

"Hundred bushel" corn clubs have been around for a long time. But Moore County, North Carolina, has come up with something new—the "No-till Hundred Bushel Corn Club."

No-till is one method of minimum tillage cultivation, and this relatively new practice is catching on fast. Recently the Moore Soil and Water Conservation District, which has been promoting no-tillage, held a corn banquet to honor farmers using this method.

Of some 300 farmers in the area using no-till, 26 had produced more than 100 bushels to the acre in the fertile soil of Moore County. The top winner, Max Dunlap, came very close to 200 bushels an acre—the actual production was 199.98. Runners-up were Gerald Sanders, with 189.5 bushels and Hobart Hussey with 184.7 bushels.

In no-tillage methods, seed is planted in a very narrow strip—2 to 3 inches wide—leaving the soil largely undisturbed. Crop residues or sod stay between the planted strips. In Moore County, this technique has resulted in an increase of 10 to 15 bushels per acre over conventionally plowed fields. About 3,000 acres were planted by no-till in 1973, and even larger acreage is expected this year.

In addition to corn, farmers in Moore County are "just beginning" to use no-till for soybeans, while some cotton has been planted in a minimum tillage demonstration.—PAUL R. BRITT, *soil conservation technician, SCS, Carthage, North Carolina.* ♦

Elsewhere . . .

A Georgia conservation supervisor employed no-till techniques in 1973 to set what District Conservationist Claude R. Gaines has called a state record of 204.6 bushels of corn per acre. Supervisor Ben Overstreet of the Upper Chattahoochee River District grew the record yield on 13 acres of bottom land along the Etowah River in Dawson County.

Overstreet explained that early in May of 1973 he planted his corn in grass, briars, weeds, and water at the rate of 21,600 stalks per acre—land that most farmers in his area would consider ill prepared for cultivation. Overstreet limed the land, then planted and immediately sprayed the ground with herbicides and nitrogen fertilizer.

During the growing period, some of the area was flooded for several hours when the corn was 6 inches high. Nothing was done to the corn between spraying and harvest.

Overstreet regards no-till as an effective conservation practice that reduces sediment yield and water runoff.



He's "corn-ered" the market! Max Dunlap, the North Carolina winner. Mr. Dunlap's yields have increased every year since 1966, when he began no-tilling.

continued from p. 9

Why natural areas are important

and they were encouraged to contact their local conservation districts and SCS representatives.

This was followed by SCS Advisory EVT-24 entitled "Natural Areas Policy and Procedure." This briefly describes The Nature Conservancy, mentions that local representatives of the Conservancy may be asking SCS for assistance, and includes a directory of local Conservancy preserve managers. The advisory encouraged SCS people to inform local Conservancy representatives about conservation district programs and services available in the areas where our preserves are located.

The reason for doing all this was to bring some of the skills and services, developed over the years by the SCS and the conservation districts, to the volunteers and staff that are charged with managing Nature Conservancy preserves. Many of our volunteer managers are dedicated conservationists who have raised money to purchase an area but who have little experience in land management. We are asking these people to prepare fairly sophisticated master plans for each of our preserves and most of them need professional help.

Initially we thought that SCS and district assistance would be in the form of providing basic data such as soil maps, air photos, and hydrological information. However, we have been very happy to discover that they are not only providing this essential data but also assisting in its interpretation and the actual preparation of master plans.

Some of the areas where we've worked with SCS and district people are:

- Yankaur Preserve, W.Va., where we received a soil and vegetative resource inventory.
- Finzel Swamp, Md., where we received information on soils and their capabilities for different uses, as well as geologic and vegetative maps.
- Blowing Rocks Preserve, Fla., on the Atlantic coast, where there was a severe erosion problem. SCS people were of considerable help in advising us on techniques to reduce the damage.
- Devil's Den, Conn., which includes a large, heavily-used nature center. The dam and millrace on an early 19th century millpond were deteriorating, and we asked for—and received—help on improving the pond and the dam.
- Patagonia-Sonoita Creek Sanctuary, Ariz., which is well known as an oasis for southern birds. Unfortunately, the refuge is being threatened by upstream pollution and The Nature Conservancy, district, and SCS people are working to find a solution.
- Merril Lake Sanctuary, Long Island, N.Y., where our local chapter is working with the Suffolk County Soil and Water Conservation District to provide top level management of the area.

We're pleased with early SCS—district—Nature Conservancy work, but we don't feel it's in full swing yet. We have 450 nature preserves to provide for and we're adding a new one every 2–working–days. Our preserve management capability is spread thin and needs help. We will continue to encourage our volunteers to turn to their local conservation districts for assistance in resource management. ♦



Soil surveys

Maryland

Cecil County. By Richard A. Andersen and Earle D. Matthews. *1973. Soil Conservation Service in cooperation with Maryland Agricultural Experiment Station. 119 pp., illus.; maps.*

Worcester County. By Richard L. Hall. *1973. Soil Conservation Service in cooperation with Maryland Agricultural Experiment Station. 78 pp., illus.; maps.*

Secretary Butz

continued from p. 5

Every American should be invited to join this partnership. Together we can assure an adequate flow of food and fiber to meet the needs of a population growing both in numbers and in affluence—in a manner consistent with the prudent husbandry of the resources which make it possible, and which the Lord has entrusted to all of us. ♦

Michigan

Leelanau County. By Hermann L. Weber. *1973. Soil Conservation Service in cooperation with Michigan Agricultural Experiment Station. 90 pp., illus.; maps.*

Minnesota

Steele County. By Joseph F. Cummins, Carroll R. Carlson, Grenfall F. Harms, and D. Kirk Woodworth. *1973. Soil Conservation Service in cooperation with Minnesota Agricultural Experiment Station. 102 pp., illus.; maps.*

Ohio

Ashtabula County. By Neil E. Reeder, Victor L. Riemenschneider, and Paul W. Reese. *1973. Soil Conservation Service in cooperation with Ohio Department of Natural Resources (Division of Lands and Soil) and Ohio Agricultural Research and Development Center. 114 pp., illus.; maps.*

Hancock County. By Donald F. Rapparlie and Donald R. Urban. *1973. Soil Conservation Service in cooperation with Ohio Department of Natural Resources, Division of Lands and Soil, and Ohio Agricultural Research and Development Center. 94 pp., illus.; maps.*

Texas

Collingsworth County. By Harry F. McEwen, Frankie F. Wheeler, and Jack C. Williams. *1973. Soil Conservation Service in cooperation with Texas Agricultural Experiment Station. 56 pp., illus.; maps.*

Kent County. By Wayne E. Richardson and C. L. Girdner. *1973. Soil Conservation Service in cooperation with Texas Agricultural Experiment Station. 67 pp., illus.; maps.*

Midland County. By Harold W. Hyde, Nathaniel R. Conner, and Herbert R. Stoner. *1973. Soil Conservation Service in cooperation with Texas Agricultural Experiment Station. 43 pp., illus.; maps.*

Meetings

April

- 2–6 *Association of Interpretive Naturalists, Inc., Asilomar Beach, Calif.*
- 3–5 *Twelfth Annual Symposium on Engineering Geology and Soils Engineering, Boise, Idaho*
- 3–6 *National Rivers and Harbors Conference, Washington, D.C.*
- 7–11 *American Association for Community Development, New York, N.Y.*
- 8–12 *American Geophysical Union, Washington, D.C.*
- 9–11 *Identification and Transformation of Aquatic Pollutants Symposium, Athens, Ga.*
- 17–19 *International Livestock Environment Symposium, Lincoln, Nebr.*
- 21–24 *National Water Safety Congress, Charleston, W. Va.*
- 22–24 *Garden Club of America, Atlanta, Ga.*
- 22–24 *National Academy of Sciences, Washington, D.C.*
- 24–26 *Hardwood Plywood Manufacturers Association, New Orleans, La.*
- 26–28 *The Nature Conservancy, Washington, D.C.*
- 28–30 *Chamber of Commerce of the United States, Washington, D.C.*
- 28–May 1 *Association of American Geographers, Seattle, Wash.*

May

- 2–3 *California Fertilizer Conference, Anaheim, Calif.*
- 4–5 *Sierra Club, Los Angeles, Calif.*
- 5–8 *National Forest Products Association, Washington, D.C.*
- 6–9 *Southern Forestry Conference, Daytona, Fla.*
- 8–9 *Fourth Annual American Family Camping Congress, Chicago, Ill.*
- 11–16 *Fortieth Annual National Planning Conference, Chicago, Ill.*
- 12–16 *National Council of State Garden Clubs, Inc., Boston, Mass.*
- 19–26 *Soil Stewardship Week*
- 20–23 *American Institute of Architects, Washington, D.C.*
- 26–June 1 *General Federation of Women's Clubs, Minneapolis, Minn.*

June

- 2–5 *American Institute of Chemical Engineers, Pittsburgh, Pa.*
- 4–6 *International Exposition and Seminar on Water Resources Instrumentation, Chicago, Ill.*
- 16–19 *National Watershed Congress, Pittsburgh, Pa.*
- 16–21 *American Water Works Association, Boston, Mass.*
- 16–21 *Ecological Society of America, Tempe, Ariz.*
- 23–26 *American Society of Agricultural Engineers, Stillwater, Okla.*
- 23–27 *National Environmental Health Association Annual Educational Conference, Cincinnati, Ohio*
- 24–26 *American Plywood Association, Portland, Oreg.*
- 24–28 *American Society of Civil Engineers National Symposium on Water Quality Planning, Ithaca, N.Y.*
- 24–28 *American Society for Testing and Materials, Washington, D.C.*
- 26–30 *Association of Consulting Foresters, Ocean Shores, Wash.*
- 28–July 3 *National Education Association, Chicago, Ill.*
- 29–July 3 *American Seed Trade Association, Inc., St. Paul, Minn.*
- 30–July 2 *American Society of Farm Managers and Rural Appraisers, Inc., (Summer Meeting), Boise. Idaho*
- 30–July 4 *American Society of Landscape Architects, Bal Harbour, Fla.*

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D. C. 20401

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300
AGR 101

U.S. DEPT. OF AGRICULTURE
NAT'L AGRIC. LIBRARY

MAY 21 '74

U.S. MAIL

POSTAGE AND FEES PAID
U. S. GOVERNMENT PRINTING OFFICE

MOVING? Send present mailing label and new address, including zip code, to Division of Public Documents, U.S. Government Printing Office, Washington, D.C. 20401.

Recon . . .

Drip cheap. Measured in terms of money, water is the cheapest of American commodities says Dr. Harold M. Stults, representative of USDA's Economic Research Service on Western U.S. Water Plan Study. "Dirt cheap" is a common expression. Yet Dr. Stults points out the price of dirt in the metropolis of Denver is about $1.50 a ton. Dirt delivered to the door is about $2 a ton. By contrast, water is delivered to Denver residences 24 hours every day of the year for about 14 cents per ton or 56 cents per 1,000 gallons. Even in central Arizona where water is often scarce, H_2O is delivered to Salt River Project farmers for about $0.0015 a ton or $0.000006 a gallon, Dr. Stults said.

Man from Mississippi. W. L. Heard, state conservationist for Mississippi and 40-year veteran of SCS, has been named "1973 Man of the Year in Service to Mississippi Agriculture" by the *Progressive Farmer* magazine. The citation reads in part: "The state suffered tremendous flood damage last year. However, as severe as it was, losses would have been even more catastrophic except for the flood prevention and watershed projects that Heard has been so instrumental in promoting and developing."

Arkansas tops in bait fish farming. Uniquely American, bait fish production is becoming quite an enterprise says the Fish Farming Experiment Station at Stuttgart, Arkansas. More than 50,000 acres are used for bait fish production. Arkansas leads the states with 29,091 acres. Minnesota comes in second with 12,900 acres. Mississippi has 1,740 acres; Louisiana, 1,500 acres plus; and Missouri, 1,200 acres. All types of bait fish—such as golden shiners, goldfish, carp, suckers, flatheads—are included in the Fish Farming Experiment Station tabulation.

Sixty acres equals a city. According to pollution authorities quoted in the *Wall Street Journal*, a 60-acre feedlot on a rainy day can produce runoff into neighboring streams equal to the raw sewage from a city the size of Galveston, Santa Barbara, or Miami Beach.

☆U.S. GOVERNMENT PRINTING OFFICE: 1974 541-630/8 1-3

SOIL conservation

U. S. Department of Agriculture / Soil Conservation Service / May 1974



From the Administrator

A new plan for water resources

SCS field offices across the nation are being introduced to the new USDA procedures for planning of water and related land resources. The procedures, developed in consultation with the Economic Research Service and the Forest Service, change the planning of watershed projects, river basin studies, and water measures within resource conservation and development projects.

Based upon the principles and standards published by the Water Resources Council on September 10, 1973, these new procedures require specific consideration of two objectives in planning for water resource development—national economic development and environmental quality.

In planning most water resource projects at least three plans will normally be formulated: a plan which optimizes national economic development, a plan which emphasizes the environment, and a "marriage" of the two viewpoints in the third plan. These three plans will be displayed in four "accounts": national economic development, environmental quality, regional development, and social well-being.

By comparing the effects of alternative plans through the display accounts, local decisionmakers, congressional committees, and the general public will be able to see what trade-offs are involved, and to decide on the best plan of action to meet needs in the watershed.

The displays in the four accounts expand the limited monetary display of benefits and costs which have been used in presenting previous plans. Some of the effects will still be displayed monetarily; others, such as environmental and social well-being effects, will be in nonmonetary terms.

This procedure will result in a plan that recognizes the myriad of potential uses of water resources to meet the diverse needs of the general public. Specific objectives of special interest groups will be examined, analyzed, displayed, and the trade-offs presented. SCS planning will increase consideration of nonstructural measures, in harmony with the intent of Congress as expressed in the Water Resources Development Act of 1974.

Sponsoring groups such as county governments and conservation districts will have the responsibility to pull together public input and insure that the final plan reflects the preferred mix of public concerns. Anyone who has an interest in a proposed project—an individual, a state labor department, municipal works board, or private organization such as sportsmen's or environmental groups—will find the information of concern to them. Our aim is to provide the facts, interpretations, and trade-offs that all concerned individuals and groups will need to participate effectively in making the decisions.

The new procedures mean changes for SCS water resource planning. There will still be difficulties to overcome in implementing this new mode of planning. But the concepts are right, and we aim to make them work.

Kenneth E. Grant

SOIL conservation

May 1974, Vol. 39, No. 10

Contents

2 From the Administrator

4 Working with nature in flood plains
by William B. Davey

6 Looking out for fish in watershed projects
by Olan W. Dillon

8 When Old Man River Raged
by Rose Fleming

10 They're taming a panther
by Robert L. Harryman and Dale Mitchell

11 A bull's-eye for reclamation
by George McGrath

12 Ponds are for . . .

14 More water, less work for Iowa farmer
by Mark Berkland

15 Arkansas thinks young
by Jack Gibson

16 Colorado finds new uses for range site surveys
by E. F. Sedgley

18 Planned grazing in the beef state
by Vincent Price

20 Fishermen's find
by James R. Shelton

20 What?

22 Recon

22 Soil surveys

23 Meetings

COVER: Farmers have built almost two million ponds—including this one in West Virginia.

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

EARL L. BUTZ, Secretary of Agriculture.

KENNETH E. GRANT, Administrator, Soil Conservation Service

CAROLYN M. JOHNSTON, Editor

MARYELLEN BERTRAM, Editorial Assistant

SOIL CONSERVATION, the official magazine of the Soil Conservation Service, is published monthly by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. Use of funds for printing this publication approved by the Director of the Office of Management and Budget, July 17, 1973.

Reprint permission: Contents of this magazine may be reprinted without permission. Credit is not required but is appreciated. Photographs are available on request.

Commercial names: Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscription: $5.65 per year, $7.10 foreign. Single copy, 50 cents. Discount of 25 percent on orders of 100 or more sent to some address. Order direct from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Working with nature in flood plains

by William B. Davey
Deputy Administrator for Water Resources, SCS
Washington, D.C.

Imagine a pristine valley adjoining a stream, acted upon only by natural forces.

Now add Man to that valley.

Being a resourceful opportunist, Man soon began to view these level areas—riverine flood plains—as ideal places to build his homes, stores, factories, and large cities. He proceeded to do so, insuring himself of a good supply of water and a running stream into which to dump his wastes.

The result—as a recent study notes—is that 16 percent of all urban areas in the United States are in flood plains and over 50 percent of flood plains in urban areas are already developed.

Of course, Man had flood problems with flood plains. Yet, historically, he was so convinced of the advantages of flood plain exploitation that instead of moving away when the rains came he looked for ways to reduce their damage.

Man built dams, enlarged channels, and constructed floodwalls, levees, and similar structures for that purpose. Structural protection became the basic flood management policy of the United States until well into the twentieth century.

But "protected" flood plains are even more valuable. So the cycle of man-builds-nature-destroys continued, and flood losses mounted.

A New Look

An adjustment in federal flood control policy began in 1966, when President Lyndon Johnson sent to Congress a task force report (House Document 465) entitled "A Unified National Program for Managing Flood Losses." The President—and the report—urged immediate action to learn more about flood hazards and to apply the knowledge in flood plain management.

Policy changes slowly, especially when it conflicts with long-held values. But since 1966, a number of important changes have occurred in both the public's attitudes toward land use and in official activities in the field of flood plain use. These include:

a) Acceleration of the flood hazard information studies of the Corps of Engineers, the Soil Conservation Service, and other agencies.

b) Publication of the Water Resources Council (WRC) reports, "A Uniform Technique of Developing Flood-Flow Frequencies," and "Proposed Flood Hazard Evaluation Guidelines for Federal Executive Agencies."

c) Presidential Executive Order 11296, under which federal agencies must consider possible flood hazards when locating their installations.

d) Publication of the WRC report, "Regulation of Flood-Hazard Areas to Reduce Flood Losses." This was prepared to assist state and local planning officials as they adopt their own enabling legislation and zoning ordinances.

e) Inauguration of a National Flood Insurance Program in 1968, and

f) A 1973 draft report, by the WRC, on "A Unified National Program for Flood Plain Management."

The Soil Conservation Service is a participating member of the Water Resources Council, and we were—and are—deeply involved in preparation of WRC reports. By the end of 1973, SCS had 66 flood hazard studies underway in 23 states. We are also working on a variety of flood insurance studies financed by the Department of Housing and Urban Development. We have, for example, compiled a list of all 13,500 flood-prone communities in the nation. We are now securing maps of these communities, delineating flood-prone areas in 15 states and Puerto Rico, and working on 155 detailed flood plain studies in 37 states.

Flood Loss Reduction Techniques

Once flood-prone areas have been identified and studied,



A flood plain doing what comes naturally.

the question becomes, how can the federal government and state and local agencies help to reduce flood losses? Speaking very generally, they can:

—Modify the physical impact of flooding—the traditional approach of dams and other structural forms of protection.

—Modify the socioeconomic impact of flooding on individuals and the community through flood insurance, tax adjustments, early warning systems, and post-flood recovery help.

—Modify the area's susceptibility to flood damage by avoiding noncompatible uses. This might involve zoning the flood plain for parkland or other relatively "low risk" uses, or relocating existing buildings.

Cities and rural communities in fully developed flood plains will continue to need flood protection through engineering structures. Relocation or other nonstructural devices are not viable alternatives. But we can look at undeveloped or partially developed flood plains and seriously evaluate their opportunities for nonstructural forms of flood protection.

Application to the Small Watershed Program

How does the Soil Conservation Service apply this in the PL-566 small watershed program?

SCS is taking a closer look at the land, the laws, and the techniques involved in its work.

The erosion control principle of "Keep the raindrop where it falls" is still uppermost in our thinking. Such soil conserving methods as minimum tillage, vegetative cover on the land, terraces, small ponds, and grassed waterways help to slow the force of rainfall runoff, reduce sediment loads, and preserve an area's scenic qualities.

But land treatment alone will seldom reduce serious flooding to tolerable levels. Our next step is to examine the remaining flood hazards and see how they relate to present land use. We discuss this subject in detail with watershed sponsors.

We are now working with local sponsors on a South Carolina watershed project which includes only land treatment and such nonstructural measures as land use regulations consistent with existing legislation. We are, for example, providing natural resource inventory information on the capabilities of the land and suitable future uses. Other states have become interested in this approach, and we expect its popularity to increase.

Structural works will remain a part of many small watershed projects assisted by SCS. There is often no other feasible method to reduce flood losses on prime agricultural land or in developed areas. But SCS is thinking of total land use and water management systems, not flood protection alone, as we help sponsors plan their projects.

Legislation

Existing federal legislation au-

continued on p. 20

Looking out for fish in watershed

by Olan W. Dillon *Regional biologist, SCS* *Fort Worth, Texas*

Many people favor flood prevention and more water for farm or community use. Fishing enthusiasts, however, are sometimes concerned when a PL-566 small watershed project changes their local fishing stream. What, ask these sportsmen, will happen to the fish?

What happens depends to a large extent on how carefully fish and wildlife resources—actual and potential—are considered when small watershed projects are being planned. We know that fish habitat can be damaged if proper mitigation or enhancement measures are ignored.

The planning begins by assessing fish and wildlife opportunities on a proposed small watershed site. The fish and wildlife assessment is generally done by a group of biologists from the state game agency, the Bureau of Sports Fisheries and Wildlife, and the Soil Conservation Service.

Armed with this information, biologists and fishermen can work out ways to maintain or improve the habitat for fish.

One of the more obvious ways to minimize habitat damage is excavating a stream from one side of the channel only. In Buck Creek, Upper Blue River Watershed in Indiana, for example, the one-sided excavation left trees and brush on the other bank untouched. The trees shade the stream, provide wildlife habitat, and preserve the beauty of the watercourse.

The Buck Creek project also involved shaping, fencing, and seeding the spoil to reduce sediment formation, while the installation of rock weirs, at about four weirs per mile of stream, mitigated the loss of fish habitat.

The rock weirs create pools that are used by the fish. In 1973, a sampling of the stream showed 8 of the 10 species of fish that were present before the project started were still present. An Indiana Department of Natural Resources biologist believes the other two species will return this year.

In Crow Creek, Alabama and Tennessee, 34 fish habitat development structures, 2 oxbow developments, and a floodway were installed.

The habitat structures are log weirs to mitigate the loss of fish in new channel sections. Six weirs were installed in 1970 to determine their feasibility for smallmouth bass in a cool water stream. In 1973, 28 more weirs were put in. When all planned fish habitat structures are installed in Crow and Little Crow creeks, there will be about 15 structures per mile of new channel.

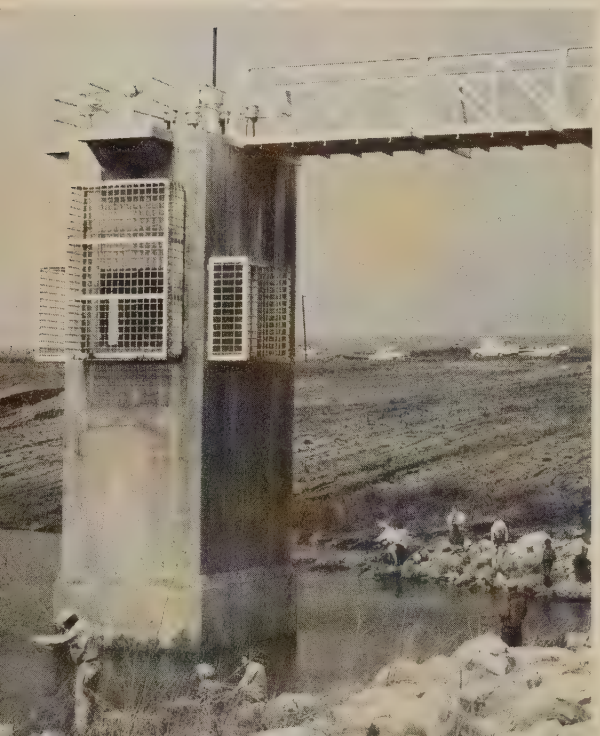
The floodway, on the Little Crow branch of Crow Creek, was designed to take only floodwater, allowing the low flow of the creek to continue through the old channel. SCS is still educating itself on floodway construction, but this method shows strong promise for preserving natural meanders in streams that have flood problems.

Anadromous fish pose a problem for watershed planners. Salmon and other fish that ascend rivers from the sea require special care and consideration.

In the Skipanon River Watershed Project, Oregon, an 8- by 10-foot door-type flood control gate and several small fish ladders permit silver salmon, searun cutthroat, and steelhead trout to pass upstream to spawning grounds.

In the Central Sonoma Watershed, California, mitigation measures were installed on the Santa Rosa Creek so that adult steelhead trout could pass through about 9 miles of altered channel. A 1,500-foot-long fish pasageway, 4 feet wide by 3 feet deep, allows fish to go through a 14-foot-square box when the creek goes under the city of Santa Rosa. A vertical slot fishway was installed at the junction of a sand trap and a vortex tube. In other parts of the channel, fish resting areas were placed

Chickasha Lake flood prevention structure in Caddo County, Oklahoma, showing principal spillway riser with drawdown gate to permit water level control.



in the channel bottom.

The passage of anadromous and other migratory fish is also accomplished by altering the design of the principal spillway tube. Water depth and velocities then permit the freer passage of fish. In structure No. 8 of the Twin Parks Watershed in Wisconsin, the principal spillway tube was notched to insure a minimum depth of 4 inches of water. The gradient of the tube maintained a velocity of 4 feet per second, allowing trout to pass through the low flow notch.

Tilted rock structures were designed in Beaverdam Creek, Tennessee, to maintain water temperature and allow fish to pass. The structures produced a 3-foot depth of water in place of a wider but much shallower flow. The 3-foot groove was placed as close to the west bank as possible to shade the fish from afternoon sun.

Maintaining the right water temperature in streams or channels is important in creating or preserving fish habitat. Trout are especially susceptible to overheated water. They do best in water between 50° and 65° F. and die at 86° F.

Properly constructed reservoirs provide an opportunity to maintain the right temperature for trout. Bottom water overflows help to do this in several watershed projects. Water near the surface of a reservoir is warmer than the deeper waters below; by removing water from the bottom of the reservoir instead, engineers for the Twin Parks Watershed in Wisconsin can warm the reservoir earlier each spring, benefiting trout who live behind the dam.



210-acre Cullaby Lake in Clatsop County, Oregon, helps control floods and provide recreation. Fish ladder on the right provides passage for migratory fish to upstream spawning habitat.

In the Hightower Creek Watershed Project, Georgia, bottom water overflows were installed in reservoirs to help preserve a marginal trout fishery in the stream below the structures.

Bottom water overflows also draw off oxygen-deficient or toxic waters and thereby increase the living space of fish in reservoirs. Oxygen-deficient waters are aerated as they drop through the primary outlet into a stilling basin before entering the stream below.

Of course, planning for water temperatures provides opportunities as well as problems. Fish habitat could be significantly improved by multiple release openings for regulating the temperature of outflow water — perhaps taking water from the surface of the reservoir in the spring and bottom water in the hot days of August.

Pool diggers were used in the Genegantslet Creek Watershed Project in New York to create pools for trout use. Basically, the pool diggers consist of log structures which force stream flow into the center of the channel and onto an inclined ramp. The stream flows over the ramp and creates a small waterfall. Water pressure from the fall carves out a pool very rapidly. In addition, a riffle area forms around the edges of the pool where the trout can feed at dawn.

continued on next page

continued from p. 7

Good engineering methods and advance planning in watershed projects often mitgate or even improve fish life. Our primary interest is in providing a better habitat for people—and that includes looking out for fish. ♦

Our engineers versus their engineers

Sometimes two different teams of engineers—humans and beavers—will work at cross-purposes. This has occurred in some watershed projects. To make an area more livable for people, SCS engineers will install a dam in a creek to prevent flooding. To make the same area more livable for themselves, beavers will install another dam — right on top. All too often the overflow system protecting the human dam is blocked by the beaver dam, endangering both structures during a flood.

However, SCS engineers have come up with something that provides for togetherness—a bottom water overflow system. Beaver "structural works improvement" are crudely constructed of logs, and thus float at or near the surface of the water. This blocks the surface water overflow systems, but bottom water releases are still safe.

With bottom releases the confrontations between our engineers and their engineers can cease.

When Old Man River Raged

by Rose Fleming
Information specialist, SCS
Jackson, Mississippi

Mississippi newsmen, recapping major news stories of 1973, rated last year's spring floods as the top story in the state.

During the 89 days that Mississippi's rivers were at flood stage, damages mounted to $140 million, according to press reports. Over 3 million acres of Mississippi land were inundated. Some 10,000 homes were destroyed or damaged in the Delta section alone, along with statewide damages to agricultural land and property.

Bad as the flooding was, it would have been considerably worse without the flood prevention reservoirs and accompanying soil conservation work done by local people with Soil Conservation Service help.

In Carroll County, flooding was very severe, reaching the 200-year frequency stage. Some 121 SCS-designed reservoirs of varying size held back 100,000 acre-feet of water, protecting the city of Greenwood and the Delta areas of Carroll and LeFlore Counties.

As Travis Taylor, SCS area conservationist at Greenwood, put it, "Without those reservoirs, 177 square miles of Delta land would have been sloshing in another foot of water. Almost all homes and businesses in an 8-mile-wide strip between Greenwood and Bluff Hills—that's 26 miles long—would have had it! As it was, half the buildings in this heavily populated area escaped serious damage."

Flood prevention structures proved to be soundly designed and constructed. Only one of the 121 dams broke—despite the 200-year storm—and the break was so slight the nearby landowner temporarily repaired it himself.

Soil conservation work on the land also helped reduce flood damages. In Carroll County alone, over the past few decades, 62 million trees were planted to help heal old gullies. When the rains came, the trees helped anchor the soil and reduce the amount of sediment load washed downstream.

Throughout Mississippi, in the flood-filled spring of 1973, the story was repeated. In the Askalmore Creek Project, Tallahatchie County, floodwaters filled seven of the eight structures to capacity. Water flowed down emergency spillways, as designed. Peak flood waters were reduced so all downstream channel levees held fast.

Jack Webb, chairman of the Tallahatchie Soil and Water Conservation District, said, "In the past, sediment loads up to 2 or 3 feet would cover our valley after a rain. This almost

wrecked the land for cultivation. But last year our watershed project protected the land and we had little sediment damage."

At New Albany, where almost 10 inches of rain fell in 3 days, parts of the business district flooded for the first time since the Yazoo-Little Tallachatchie project was substantially completed some 19 years ago. Before the project, New Albany regularly flooded several times a year.

A recently completed PL-566 watershed project on Town Creek, in West Point, kept floodwaters within creek banks. West Point's mayor called it "the best buy for the money I've seen in recent years." It is part of the Northeast Resource Conservation and Development Project.

But perhaps the most dramatic story of all occurred in the city of Tupelo.

Tupelo people are wary of floods. The southwestern part of their city suffered more than $695,000 in flood damages from a 1962 storm. Arvie T. Whitenton, president of a local music company, saw floodwaters 8 feet high wash over his business location that year, and at least one factory in the area, with a hundred employees, was destroyed and never reopened.

Because they know about floods, local people cost-shared a PL-566 flood prevention structure on nearby King's Creek which was designed to protect the southwestern edge of Tupelo and surrounding farmlands.

"After the King's Creek structure was substantially finished in July 1971, we could use the area with much more confidence," said Mr. Whitenton. "Today, 4 factories, a large building supply company, and 27 retail businesses are in the immediate area. Their value is in excess of $10 million and they employ hundreds of people."

Hugh Purnell, for example, owns a chicken processing plant in Tupelo that employs 300 people. In the 1962 storm, he was flooded out for 3 days and lost more than $100,000. But in the even more severe flood last year, his plant operated at normal capacity, with no delay and no appreciable water damage.

Construction costs for the King's Creek project were well under $200,000. George McLean, publisher of the Tupelo Journal, estimates that this investment prevented millions of dollars in damages to local businesses. "The financial loss to the Journal alone without this structure would have been $40 to $50 thousand," says McLean.

In 1973, SCS-assisted small watershed projects in Mississippi battled the worst floods of recent years. Designed for 100-year frequency storms, some of them faced even more than that ultimate test. They survived—and helped people and property to survive—as they were planned to do. ♦



Tallahatchie River, Mississippi, during nonflood period.



WHO—local people view project area.



WHAT—outlet in a floor prevention structure.

They're taming a panther

They're taming Panther Creek in northwestern Missouri.

A few years ago, even small rains would cause the Panther to leap its banks, destroy crops, damage roads, and rip out fences. "But that's nearly past history, thanks to the Panther Creek Watershed Project," says Merrill Grant, farmer, of nearby Ridgeway.

Grant's feelings are echoed by his neighbors. Jimmy Osborn, who farms Panther Creek bottomland, says, "A few years ago we were lucky to get corn planted without a flood. Even when the corn got in all right, the crops were often flooded in the fall. But a few years ago, when a 3-inch rain fell, those upstream dams kept us nice and dry."

Better farming conditions are only one benefit. There's also less flood damage to fences and roads. As for wildlife—"Those people who say wildlife are hurt ought to come down here and see what's happened," says Grant. "The fact is, wildlife drown in floods, and raw gullies aren't much of a home for them either. We've got more quail, rabbit, and fish than we ever had before."



Jim Osborn. "The creek would have flooded from hill to hill if the structure hadn't been installed."

Water supplies for people are another plus. Some of Mr. Grant's neighbors hauled water 10 to 20 miles to their homes before the dams were built. Today, several families have their own wells just below a dam.

The Panther Creek project has four completed flood prevention dams, two more that will be finished this year, six major gully control dams, and a number of smaller gully-stoppers. The soils along Panther Creek, developed in glacial till, are highly erosive and gullies develop rapidly unless controlled.

The watershed project isn't all work and no play. Early in the planning for Panther Creek, Ernie Tripp, farmer, insurance



WHY—stabilizing gullies is one reason.

by Robert L. Harryman
RC&D Project Coordinator, SCS

and Dale Mitchell
District conservationist, SCS
Bethany, Missouri

man, and president of the Ridgeway Lions Club, suggested the Lions develop a public recreation area for the town near one of the newly built lakes. Each member of the club was asked to fatten a calf and donate its sale value to the project. The idea became popular and 20 to 25 calves a year were fattened out for the project. The Lions have now leased a 5-acre tract adjoining the largest lake and plan to develop a beach, boatdock, and picnic area.

The Panther Creek project began back in 1956 when Merrill Grant and other local people asked the Soil Conservation Service for help in overcoming flood problems.

Community meetings were held to explain the small watershed program concept of federal cooperation for local projects, and a number of interested citizens toured Kansas and Nebraska to see how other communities were meeting their flood problems. "I remember," says Mr. Grant, "that one group had been able to replace a 60-foot bridge with a dam and a 36-inch pipe."

In 1958 a watershed subdistrict was organized in the Panther Creek area, and the project was on its way. All dams in the project will be completed this year.

What's the secret of carrying out a successful project like this? "A lot of time and work by everyone involved," says Merrill Grant. "We held meetings, we raised money and nine of my neighbors purchased a farm—where the largest lake now is—to get the project started. Most of all, we worked together—everybody did their bit to help us tame the Panther." ◆

A bull's-eye for reclamation

In Nicholas County, W. Va., members of the Wadcutters Gun Club, with Soil Conservation Service assistance, have developed two, 2-acre parcels of surface-mined mountain land into a 4-acre pistol range.

Club members reclaimed the first 2 acres in 1968, and the second adjoining 2-acre site a few years later. Both sites had been stripped of all original vegetation and topsoil, so intensive reclamation efforts were needed.

Upon request, SCS made an on-site investigation of the area. Laboratory tests showed the soil, although stripped and rather acidic, would support vegetation fairly well if carefully managed.

After grading and shaping to fill in low spots and smooth the area, club members followed the conservation plan drawn up by SCS. They applied limestone, fertilizer, and the recommended amounts of red top grass seed, tall fescue Kentucky grass seed, and sericea lespedeza legume seed. The lespedeza was put on the remaining rough, steep areas near the highwall and on remnants of outer mine spoil.

The cost of reclaiming the two sites ran to about $450 per acre, but it was well worth it. Club members transformed an otherwise scarred landscape and a source of uncontrolled erosion into an attractive, popular recreation site with modern pistol range facilities.—GEORGE McGRATH, *information specialist, SCS, Washington, D. C.*

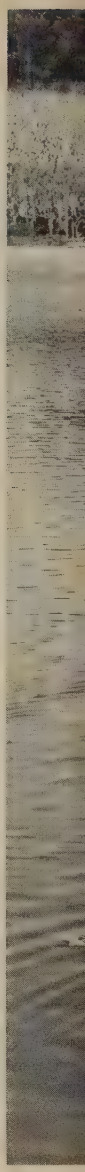
Ponds are for . . .



cattle . . .



and kids . . .





and wildlife and conservation

Ponds also are for irrigating crops and growing catfish, and controlling gullies, and holding extra water, and providing flood protection. They are fire protection for farmers, an outdoor nature classroom for schoolchildren, a stop for migratory mallards, a place to swim in water-short areas, and beauty all across the nation's countryside.

Many of the small ponds in rural America have a made-by-nature look. But at least two million of them were, in fact, made by people—farmers, ranchers, other landowners, and small community groups. Besides beauty, recreation, and economic benefits, ponds have various useful ecological functions, such as helping to maintain the water table and providing a safe disposal area for extra surface runoff during rainstorms.

A pond, to be satisfactory, must be well located, well designed, and well built. The Soil Conservation Service helps landowners to select good sites and to design and maintain ponds that will do their intended job. "Building a Pond", USDA Farmers' Bulletin No. 2256, provides more information on—well—building a pond.

More water, less work for Iowa farmer

by Mark Berkland
District conservationist, SCS
Corning, Iowa

When you've hauled water 11 miles every hot summer day for 6 to 8 years, you welcome the chance to stop with open arms.

Homer Minnick, a farmer near Creston, Iowa, stopped the long haul last year. Before that, he sometimes made several trips daily to get water for his hog operation since his own two shallow wells couldn't furnish enough.

Minnick solved the time-consuming, expensive water-hauling chore by building a tile outlet terrace and pond system close to his farm buildings.

His system works like this: three parallel tile outlet terraces collect runoff water from cropland and funnel it through underground tile to a 1½-acre pond. The terraces trap most of the sediment, making the water nearly silt free. The clean water is then pumped 1,200 feet from the pond to the buildings and to the thirsty hogs.

Minnick says it was hard to find a good place for a well in the tight subsoil on his farm.

"And it was costing me about $1,000 a year to haul water. When Joe Knecht, SCS technician, talked to me about a terrace and pond system, I was interested. I didn't think we had a place for the pond, but by taking soil from the pond area to help build the terraces, we made one more than 10 feet deep."

The land earlier had been tiled for hillside seeps. Some of the old tile lines were connected to the new tile lines through the terraces. Together there's enough water to run continuously through the pond, insuring a fresh supply for the animals.

Minnick dug a 24-foot-deep well on the water line of the pond. Water enters the well through a floating filter and is then pumped through an underground 1-inch-plastic pipe to the farm buildings. Electrical wiring for the pump is also underground.

"I haven't had any trouble with the system," says Minnick. "No problem with freezing—it works just as well in winter as in summer."

The entire system including 3,250 feet of terraces, 8 tile intakes, 1,300 feet of tile, and the pond, pump, pipe, and well cost about $6,000.

Besides getting more water, Minnick gets more soil protection. The land can be farmed in continuous row crop "without the soil loss I used to get after a heavy rain." One terrace is built directly above the pond to protect the pond from sediment. The pond will soon be stocked with fish.

The terrace and pond system were planned, along with more terraces, wildlife habitat improvement, and other conservation measures as part of Minnick's overall farm conservation plan. ♦



Homer Minnick inspects tile intake of his terraces.

Arkansas thinks young

by Jack Gibson, president, *Arkansas Association of Conservation Districts, Dermott, Arkansas*

Arkansas soil conservation districts are successfully involving thousands of young men and women in resource conservation work. We find that young people are interested—are eager to learn—and want to be part of the action.

We hope to establish at least one outdoor classroom in each of our 76 conservation districts before school opens this fall. And in what may be our most important youth activity, we are encouraging each district to form a youth board of directors.

Our districts, in addition, carry on a variety of other activities. These include "stream cleanup" events with Boy Scouts; conservation essay contests where as many as 25,000 students have participated; woodland and pasture management contests for high school students; cooperation with vocational agriculture chapters in establishing bluebird trails; wide distribution of Soil Conservation Society of America cartoon booklets; enlarging the "conservation shelf" of many public school libraries; and sponsoring delegates to an annual Youth Conservation Workshop.

One of our earliest outdoor classrooms was established by the Woodland Heights Elementary School at Harrison, with the cosponsorship of the Boone County District. There, youngsters learn how trees grow and what environmental factors promote or restrict their growth, as well as scores of other facts that increase their knowledge of nature.

For many years, the Poteau River Conservation District has sponsored a woodland management contest for high school youth. Students write plans for their timber tracts which outline all practices that are actually needed and set a schedule for application.

A year later, their plots are judged by a panel of professional foresters drawn from the Soil Conservation Service, the Agricultural Extension Service, and the State Forestry Commission. Winners are awarded saving bonds, but more important, each entrant learns a practical lesson in woodland conservation.

The Rich Mountain Conservation District sponsors a similar contest in pasture management. The winner receives a prize, but everyone benefits by learning basic principles of grassland management.

Six districts are working with vocational agriculture chapters to establish bluebird trails. Districts purchase the material, the instructor supervises construction, and houses are sold at cost. In 1973, more than 300 bluebird houses were built and installed.

We are especially proud of our annual Youth Conservation Workshop. Our tenth one—last year—was attended by 94 youngsters, with expenses paid by local districts. Specialists from state and federal agencies donated time as instructors. The youngsters learn about forest ecosystems and the ecology of water-based environments; they learn to make tests for water quality and to manage fish ponds for fun and profit; and they study wetlands and the need for better wildlife conservation. After the week-long workshop, each youngster receives a certificate of completion. More important, each of them returns home with a better understanding of the world around him—or her.

Earlier I referred to district youth board of directors; the Miller, Grant, and West Saline Districts were among the first to start them. The young people have many projects—they help schools with outdoor classrooms, establish grass plots to study new varieties, promote wildlife plantings, and present conservation programs to many groups.

In Arkansas we have a lot of confidence in our young people. We look to them to help solve tomorrow's environmental problems. ♦



David Hartsell, left, and Ronnie Efird, youth board of directors of the Hot Spring District, giving slide talk on pond ecology.

Colorado finds new uses for range site surveys

"My client insists that we restore the 80 acres adjoining his new industrial plant to the original prairie vegetation. What was it and how do we restore it?"

"We're writing an environmental statement. Can you tell us about the natural vegetation?"

"Our school wants an environmental laboratory with natural plant communities. We'd like your help in identifying them."

"The city of Pueblo is short of water. What native plants can we landscape with, so we don't have to do much irrigating?"

These are recent requests for help from the Soil Conservation Service in Colorado.

They reflect the environmental concerns of our society and the growing need for a special kind of information on native range ecosystems.

SCS has this information. We've had it for years—to the surprise of some people—in our range site descriptions. Only, until recently, the information was primarily used by ranchers and other large landowners.



Students at Irving Elementary School in Pueblo, Colorado, study prairie plant community reconstructed from SCS range site description.

In Colorado, 122 range site descriptions cover all of the natural plant ecosystems of the state except for forests, and these are described in SCS woodland site descriptions.

A range site, by SCS definition, is "a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community."

A typical SCS range site description includes information on climate, soils, topography, and the kinds and amounts of plants in the climax plant community.

In addition, most range site descriptions indicate the amount of plant production one can expect in normal and dry years and the location, on the range, where the climax vegetation—or as close to it as possible—may be seen.

An SCS guide for determining range conditions in each site has been prepared. This helps us to evaluate the present vegetation as compared to the climax plant cover for that range site.

What this means to the seeker of information is that we can, for almost every acre in Colorado, tell you not only the highest natural potential plant community of the site, but also in what lower successional stage the community is today.

Since plants and soils de-

by E. F. Sedgley
State resource conservationist, SCS
Denver, Colorado



A range site survey can describe the natural plant community of this land even though its been planted to crops for many years.

velop together, it is entirely possible to determine the best kind of plant cover even if the land has been farmed for many years and there is no longer any native vegetation. If the soil is known, the potential climax vegetation of the site can be accurately described.

We have collected these data over many years by studying "relict" areas which have not been seriously disturbed. To a range conservationist, cemeteries, historic sites, and areas inaccessible to livestock because of topographic features are all excellent sources of information on near-climax plant communities.

SCS also makes long-term observations of vegetative "trends" after an original plant community has been disturbed and later protected. This helps us to determine if the plant community is changing toward its potential or away from it.

Until recently, the terms "rangeland" and "grazing land" have been almost synonymous. But our work on Colorado's 122 different range sites has convinced us there's an important semantic difference. Briefly, rangeland is a *kind* of land—and rangelands vary a great deal—while grazing land describes a major *use* of various kinds of rangeland.

Because range sites vary tremendously in their degree of fragility, or ability to withstand disturbance, a range site description is extremely useful to a land-use planner. That's particularly true in Colorado.

Our state is presently on the threshold of major land use changes. The energy shortage may cause considerably more development of Colorado's vast coal and oil shale reserves. The urbanization of large areas of the scenic Rocky Mountains continues. And Colorado's special combination of scenery, climate, and outdoor recreation opportunities is drawing more and more tourists and Coloradans to our once rural areas.

These land-use changes can mean drastic disturbances in the original biotic ecosystems. Yet—even as people use the land more intensively, they are demanding that environmental values somehow be retained, if possible, and restored if already damaged.

What better tool can those charged with restoration responsibilities have than the knowledge of what kinds of plant communities their particular land can support?

We are discovering that the information SCS has collected over the past 30 years can be used for many other purposes than livestock grazing management. It is really basic ecological information that helps any planner, rural or urban.

If our experience in Colorado is any indication, range site descriptions may well rival soil surveys as a resource inventory tool for good land use planning in the West. ♦

Planned grazing in the beef state

by Vincent Price
Information Division, SCS
Washington, D.C.

The American consumer's demand for more beef has put pressure on both cattlemen and grasslands. Forecasts indicate a sizable increase in the supply of slaughter cattle for 1975 over 1974. One problem facing American cattlemen is how to feed more cattle on the same amount of land.

It's economically impossible to raise cattle solely on feed grains. Breeding herds and young animals must still eat grass. And the amount of American grassland probably cannot be increased by more than 10 percent since pressures from other land uses are too great.

So where will more grass for cattle forage come from? Primarily from current pastures and rangelands which are improved to produce more grass.

Nebraska ranchers are among the leaders in increasing beef production — sometimes 100 percent—by this method.

Nebraska has the double nickname of the Cornhusker State and the Beef State. This is apt since Nebraska's agricultural land is almost evenly divided between cropland in the east and rangeland in the west.

Over the years Nebraska has become one of the top beef producing states in the Union, with approximately 2 million calves a year on 23.9 million acres of range.

In the last decade Nebraska ranchers have increased their production, while providing even better protection to their land, through planned grazing systems. Nebraska now has more than 3 million acres of land under planned grazing systems—about 15 percent of total rangeland in the state. Different systems are used depending on the weather, types of soils and grasses, water supply, and number of cattle.

Basically, a planned grazing system involves dividing a range into two or more pastures (up to nine or more in some areas), and then rotating the herd from pasture to pasture so each area is allowed to "rest" for at least part of the growing season. Resting a pasture allows grass to recover and stimulates better plant growth. Increased forage production in turn permits the same amount of land to support more cattle. The tabulation illustrates some typical Nebraska planned grazing systems.

That a planned grazing system is productive and profitable has been demonstrated again and again.

One Nebraska rancher had 140 cows and 30 replacement heifers on 750 acres of range in 1967, before he made the switch. Today, with his two-pasture planned grazing system, the rancher's 750 acres support 440 cows, 280 calves, and 15 bulls.

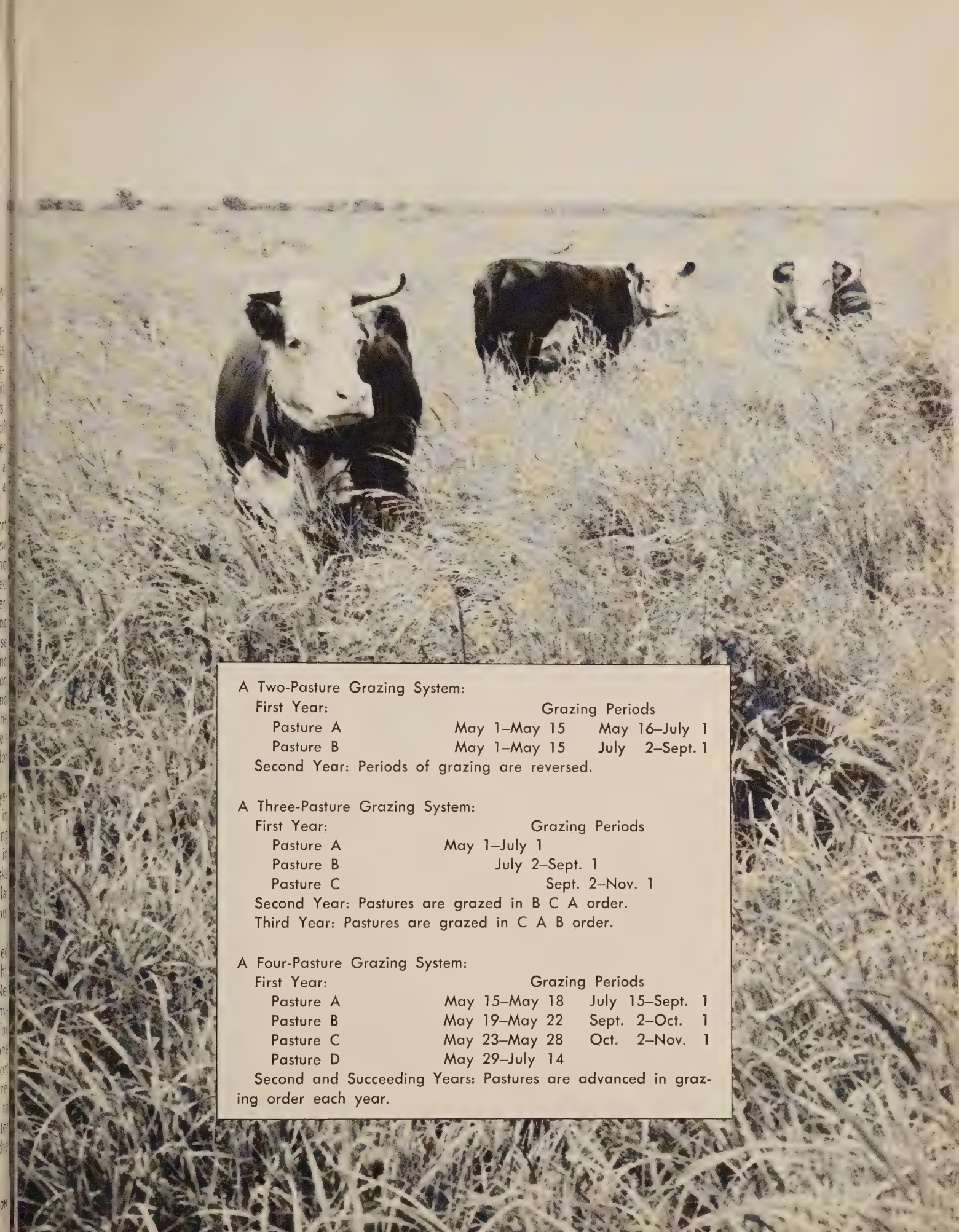
A second Nebraska rancher supported 70 cows on 640 acres of land in 1967. By 1970, using a four-pasture system the same land supported 98 cows; by 1972 it supported 108.

A third rancher used a four-pasture system on 2,560 acres of land and increased its grazing capacity by 351 animal unit months (AUM) in 4 years. Using a conservative value of $8 per AUM, the rancher grossed an additional $2,808 a year on his land—more than a dollar an acre.

Nebraska cattlemen report other benefits from the new system. Some say parasite and disease problems are decreased because pastures are cleaner. Others tell of better breeding in a cow-calf program because the herd is confined. Many find that by containing all cattle on part of the land, less travel and labor is required to oversee the livestock. In addition there's greater assurance of grass for winter grazing.

But two benefits of the systems stand out: an increase in forage production and stocking rate, and an improvement in range condition. Nebraska Sandhills ranchers in particular are pleased with the blowout control.

Still, converting to a planned grazing system takes thought, time, and effort. As one Nebraska rancher put it: "Anybody can have good grass by leaving his land idle. Anyone can produce cattle for a short time by overgrazing his pasture. But it takes a good rancher to produce more cattle and better grass on the same land at the same time." ♦



A Two-Pasture Grazing System:

First Year:	Grazing Periods	
Pasture A	May 1–May 15	May 16–July 1
Pasture B	May 1–May 15	July 2–Sept. 1

Second Year: Periods of grazing are reversed.

A Three-Pasture Grazing System:

First Year:	Grazing Periods
Pasture A	May 1–July 1
Pasture B	July 2–Sept. 1
Pasture C	Sept. 2–Nov. 1

Second Year: Pastures are grazed in B C A order.
Third Year: Pastures are grazed in C A B order.

A Four-Pasture Grazing System:

First Year:	Grazing Periods	
Pasture A	May 15–May 18	July 15–Sept. 1
Pasture B	May 19–May 22	Sept. 2–Oct. 1
Pasture C	May 23–May 28	Oct. 2–Nov. 1
Pasture D	May 29–July 14	

Second and Succeeding Years: Pastures are advanced in grazing order each year.

Fishermen's find



"The hottest fishing spot around," according to one local sportsman, "is southeastern Idaho's Montpelier Creek Reservoir."

Built in an area once covered by dry sagebrush, the clear waters of this new lake attract thousands of visitors. And R. R. "Dick" Rowland, president of the local Rainbow Rod and Gun Club, "couldn't be happier" about the added opportunity for local people to fish, boat, and swim in the 4,050-acre-foot reservoir.

The "new fishing hole" is a happy byproduct of a PL-566 small watershed project with the major purposes of preventing floods and providing late season irrigation water. And it's a top performer on those jobs as well. During 1971-1973 the dam and reservoir helped prevent an estimated $360,000 in flood damages and provided an additional 4,170 acre-feet of needed water for irrigation.

The project isn't entirely completed yet. But Idaho's Montpelier Creek Reservoir is already a valued lake for many seasons — and many reasons. James R. Shelton, agricultural economist, SCS, Boise, Idaho.

A NEW POCKET GUIDE

Land Use Planning Assistance available through the U.S. Department of Agriculture, briefly describes the more than 80 programs administered by USDA that assist rural and urban land owners and operators in making major land-use decisions. The illustrated pamphlet summarizes the various programs and lists their land-use applications. The programs offer research, education, and technical and financial assistance.

Working with nature

continued from p.5

thorizes water resource planning agencies to provide more help with structural measures for flood control than for nonstructural measures.

SCS direct authority in this field includes PL-566, the small watershed program legislation enacted in 1954. Over the years, we have been authorized to help provide water supply, recreation, and enhancement of

continued on next page

What?



A volunteer oak, growing out of a Model-T Ford, 1925 vintage, is an oddity that's good for a story anytime.

But the real story is the land underneath — so fertile that even hard metal couldn't discourage an acorn that wanted to grow.

Bob Bobbitt, Rt. 2, Hazelhurst, Mississippi, owns the oak, the Model-T, and the land. His idle field, abandoned for crops more than 35 years ago, is part of some 15,000 acres along the Bayou Pierre that are unused because floods are too severe.

The final chapter has a happy ending, however. A watershed project, cost shared by local people and the Department of Agriculture's Soil Conservation Service, is being planned for the area. Upon completion, this fertile field and others like it will be able to produce more than oddities and abandoned cars. ♦

fish and wildlife values, as well as flood prevention and water management for agriculture.

In 1973, the Rural Development Act included specific language authorizing planning help for "land utilization," in addition to the traditional "water management" concept. With this in mind, SCS strongly encourages local sponsors to include appropriate nonstructural measures, including regulation of land use, in their watershed plans. However, money for buying easements, relocating property, and so on has not been available through PL-566.

Other legislation related to the whole field of flood plain use includes:

1) The Flood Disaster Protection Act of 1973 (PL-93-234). This expands the national flood insurance program and provides for speedup in identification of flood-prone areas. Communities within these areas must establish zoning and building codes that prohibit development on flood-prone land, or else provide adequate protection from 100-year storms. The deadline for enactment is July 1975. After that, no loans for construction work from federally regulated institutions will be allowed. Federal disaster relief also will not be available to nonparticipating areas.

2) The Coastal Zone Management Act (PL-92-583) which provides grants to state agencies for developing coastal zone management programs.

3) The Water Bank Act (PL-91-559) which stresses the protection, preservation, and restoration of wetlands. A program participant develops a 10-year agreement based on a conservation plan. He is paid for preserving, protecting, or improving type III, IV, and V wetlands. This affords an alternative to development of wetlands.

4) The Agriculture and Consumer Protection Act of 1973 (PL-93-86). Title X of this Act authorizes the Secretary of Agriculture to purchase perpetual easements to promote the purposes of the Act, including the sound use of flood plains, shorelands, and aquatic areas. The provision has not been implemented.

5) Land and Water Conservation Fund Act of 1965 (PL-88-578). The nationwide outdoor recreation plan recently prepared by the Bureau of Outdoor Recreation can favorably affect flood plains. The federal government would encourage the use of certain flood plains for recreational use and Land and Water Conservation Fund money could help to buy flood plain lands.

6) Small Wetlands Acquisition Act (PL-87-383). Administered by the Bureau of Sports Fisheries and Wildlife (BSF&W), this helps preserve wildlife habitat through the purchase of easements.

7) Fish and Wildlife Restoration Funds (PL-81-681 and 75-415). These funds, administered by BSF&W, may be used in connection with fish and wildlife activities on flood plains.

8) Federal Water Pollution Control Act Amendments of 1972 (PL-92-500). The planning and standards associated with this Act will have an obvious impact on flood plain use.

9) State and local legislation. The Water Resources Council reports that by 1970 more than 15 states had adopted channel-encroachment statutes or other regulations for flood-hazard areas. The zoning enabling acts of 23 states and the subdivision control acts of 15 states specifically mention flood protection as a basis for their controls. Hundreds of cities and counties have adopted subdivision regulations with flood hazard provisions.

Congress may pass some form of land use planning legislation in the next few years. The Senate has already passed a Land Use Policy and Planning Assistance Act (S. 268) which would provide money to states to develop a land use planning process. Flood plain use would be included.

Finally, there is the recently enacted Water Resources Development Act of 1974 (PL-93-251). Included is a provision directing federal agencies to give full consideration to nonstructural alternatives in planning flood control work on flood plains. It also provides for federal cost sharing when there are viable alternatives to structural protection. To what degree this authority may be used in the small watershed program is now under study.

With some new legislation already on the books, and with other changes pending, the fog is beginning to clear. Perhaps, soon, the full range of opportunities for flood plain management can be more objectively considered and choices made without federal funding exerting an undue amount of influence.

A lot of water has gone over a lot of dams since Man first started figuring out ways to protect himself from floods. The technology for both structural and nonstructural approaches is well developed. The real key to good flood plain management lies in perfecting the institutional arrangements —local, state, or national—for making land use decisions. ♦

Recon . . .

Resource recovery — particularly energy recovery and source-separated wastepaper reclamation — is now second on the list of federal residuals management program priorities, Arsen Darnay, Chief, Office of Solid Waste Management Programs, U.S. Environmental Protection Agency, said recently. He emphasized the importance of technical aid but said he does not want the federal government involved in financing construction of resource recovery facilities except for demonstration projects.

Fill 'er up with regular, please. Several nations are examining the possibility of using abandoned mine shafts as handy storage areas for oil. Economics aside, the use of mines would decrease the pressure to build additional above-ground oil storage tanks, which have been attacked by environmentalists as adding to landscape blight. According to *Environment* Magazine, South Africa is using an abandoned coal mine for oil storage; France and Germany are using underground salt deposits for the same purpose; and a British company is looking into a proposal to store oil in an old anhydrite mine. A possible objection to the expedient is that mines were not built to store oil, and leakages could contaminate ground water reserves and play havoc with agricultural and municipal water supplies.

The battle against brush and weeds overrunning Texas rangelands can have long-term effects on the consumer. Research on a portion of rangeland totaling more than 18 million acres in a 117-county area in central and west Texas indicates that certain levels of brush control can dramatically increase beef production. If 50 percent of the brush is killed, the area could produce enough additional beef each year for 1.7 million people. Control of 25 percent of the brush would allow production of additional beef for 854,000 people. The project is one of 49 research efforts described in "Noxious Brush and Weed Control Research Highlights—1973," published by Texas Tech University in cooperation with the Texas Department of Agriculture.

"So you want to be a farmer." Maine's Penobscot Soil and Water Conservation District has tackled the problem of conservation on the farm in a new way. The district has begun holding seminars with young farmers and prospective young farmers in the county. The seminars include an explanation of the importance of proper land use and of the activities and assistance available from the district. On the other hand, the farmers and prospective farmers give their ideas as to what the major resource problems are in the district and what sort of help they're looking for.

A date with LOIS. SCS will make inputs into New Jersey's LOIS system (Land Oriented Information System), an electronic data storage and retrieval computer system. SCS will provide soils maps with interpretations and other resource data. LOIS can retrieve data in tabular or graphic form.

Soil surveys

California and Nevada

Tahoe Basin Area. By John H. Rogers. *1974. Soil Conservation Service and Forest Service in cooperation with University of California Agricultural Experiment Station and the Nevada Agricultural Experiment Station. 84 pp., illus.; maps.*

Georgia

Montgomery, Toombs, and Wheeler Counties. By Herschel L. Paulk. *1973. Soil Conservation Service in cooperation with University of Georgia, College of Agriculture, Agricultural Experiment Stations. 63 pp., illus.; maps.*

Hawaii

Island of Hawaii. By Harry H. Sato, Warren Ikeda, Robert Paeth, Richard Smythe, and Minoru Takehiro, Jr. *1973. Soil Conservation Service in cooperation with University of Hawaii Agricultural Experiment Station. 115 pp., illus.; maps.*

Kentucky

Boone, Campbell, and Kenton Counties. By B. C. Weisenberger, C. W. Dowell, T. R. Leathers, H. B. Odor, and A. J. Richardson. *1973. Soil Conservation Service in cooperation with Kentucky Agricultural Experiment Station. 67 pp., illus.; maps.*

Calloway and Marshall Counties. By Maurice E. Humphrey, Frank L. Anderson, Raymond A. Hayes, and John D. Sims. *1973. Soil Conservation Service in cooperation with Kentucky Agricultural Experiment Station. 82 pp., illus.; maps.*

New Mexico

Harding County. By Douglas S. Pease, Norman M. Davis, Parker D. Ingram, Paul Shields, Max V. Hodson, Jess C. Epple, Jr., David S. Totah, and Lonnie G. Berglan. *1973. Soil Conservation Service in cooperation with New Mexico Agricultural Experiment Station. 108 pp., illus.; maps.*

Mississippi

Oktibbeha County. By Floyd V. Brent, Jr. *1973. Soil Conservation Service and Forest Service in cooperation with Mississippi Agricultural Experiment Station. 94 pp., illus.; maps.*

Nebraska

Phelps County. By Gilbert A. Bowman, Larry G. Ragon, Charles L. Hammond, Laurence E. Brown, and Rafael A. Boccheciamp. *1973. Soil Conservation Service in cooperation with University of Nebraska, Conservation and Survey Division. 91 pp., illus.; maps.*

Meetings

May

2–3 *California Fertilizer Conference, Anaheim, Calif.*
4–5 *Sierra Club, Los Angeles, Calif.*
5–8 *National Forest Products Association, Washington, D.C.*
6–9 *Southern Forestry Conference, Daytona Beach, Fla.*
8–9 *Fourth Annual American Family Camping Congress, Chicago, Ill.*
11–16 *Fortieth Annual National Planning Conference, Chicago, Ill.*
12–16 *National Council of State Garden Clubs, Inc., Boston, Mass.*
19–26 *Soil Stewardship Week*
20–23 *American Institute of Architects, Washington, D.C.*
26–June 1 *General Federation of Women's Clubs, Minneapolis, Minn.*

June

2–5 *American Institute of Chemical Engineers, Pittsburgh, Pa.*
4–6 *International Exposition and Seminar on Water Resources Instrumentation, Chicago, Ill.*
16–19 *National Watershed Congress, Pittsburgh, Pa.*
16–19 *American Institute of Biological Sciences, Tempe, Ariz.*
16–21 *American Water Works Association, Boston, Mass.*
16–21 *Ecological Society of America, Tempe, Ariz.*
23–26 *American Society of Agricultural Engineers, Stillwater, Okla.*
23–27 *National Environmental Health Association Annual Educational Conference, Cincinnati, Ohio*
24–26 *American Plywood Association, Portland, Oreg.*
24–28 *American Society of Civil Engineers National Symposium on Water Quality Planning, Ithaca, N.Y.*
24–28 *American Society for Testing and Materials, Washington, D.C.*
26–30 *Association of Consulting Foresters, Ocean Shores, Wash.*
28–July 3 *National Education Association, Chicago, Ill.*
29–July 3 *American Seed Trade Association, Inc., St. Paul, Minn.*
30–July 2 *American Society of Farm Managers and Rural Appraisers, Inc., (Summer Meeting), Boise, Idaho*
30–July 4 *American Society of Landscape Architects, Bal Harbour, Fla.*

July

1–2 *National Symposium on Water Resource Problems Related to Mining, Golden, Colo.*
8–17 *Second International Drip Irrigation Congress, San Diego, Calif.*
13–17 *American Association of Nurserymen, Inc., Toronto, Canada*
14–17 *National Association of Counties, Miami, Fla.*
17–19 *Izaak Walton League of America, Huntington, W. Va.*
21–25 *Federation of Business and Professional Women's Clubs, Inc., Chicago, Ill.*
23–25 *National Conference on Flood Plain Management, Washington, D.C.*
25–26 *Great Plains Agricultural Council, Sioux Falls, S. Dak.*

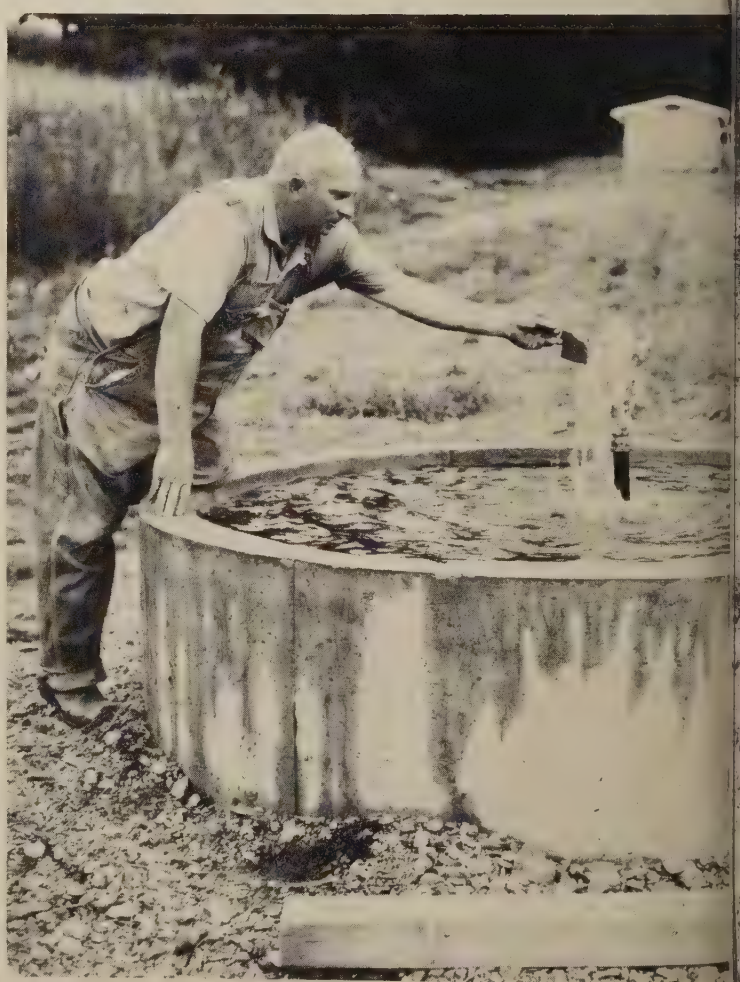
UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D. C. 20401

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300
AGR 101

POSTAGE AND FEES PAID
U. S. GOVERNMENT PRINTING OFFICE

MOVING? Send present mailing label and new address, including zip code, to Division of Public Documents, U.S. Government Printing Office, Washington, D.C. 20401.

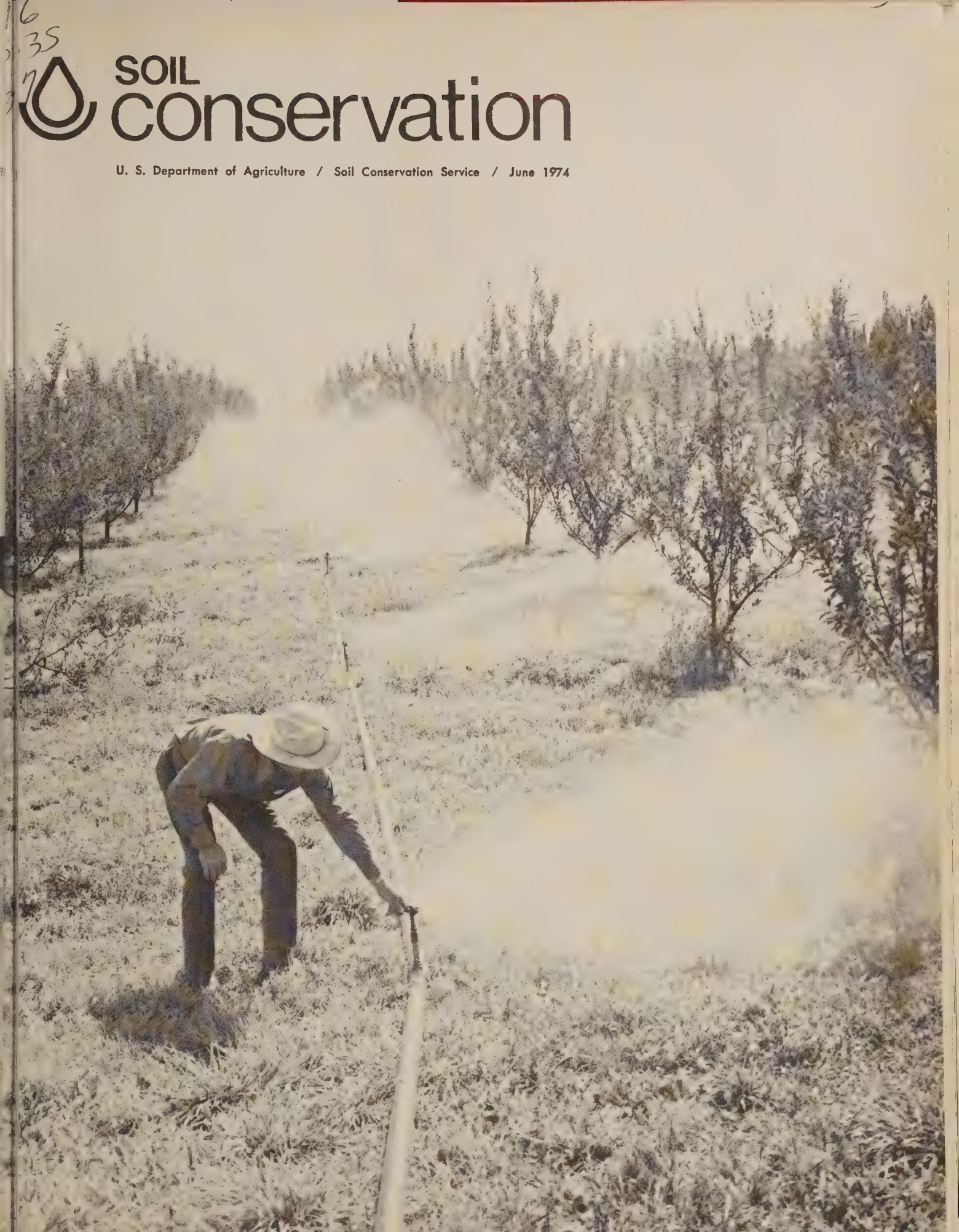




The subject this month is water—for lawns, livestock, little girls, and many other water users.

SOIL conservation

U. S. Department of Agriculture / Soil Conservation Service / June 1974



Design for quality

There is no alternative to high quality work by SCS people in all disciplines. This is especially true in the engineering field, where errors in design are readily translated into problems in construction.

The demand for SCS engineering assistance in natural resource-related work remains very high. Among our major contributions in this field are the design of ponds, terraces, irrigation and drainage systems, agricultural waste management systems, and small watershed flood prevention projects.

In all engineering work, there must be a careful consideration—a balancing—of several major factors. We must, of course, design structures and facilities that are technically adequate, that are safe, and that do their intended job. Our designs must provide users with the maximum return for the money invested; frills and superfluous additions are not acceptable. But we do consider it both necessary and desirable to "design in" the preservation of scenic and other natural visual resources as well as the preservation of desirable wildlife habitat, on a long range basis, at the engineering site.

We must, in other words, give full weight to the triple values of consistently high quality in our design work; a good return for the monies expended; and a full consideration of all nonmonetary values that will be affected.

I am very proud of the dedication, expertise, professional reputation, and high standards of SCS engineers. The tremendous performance of PL-566 flood prevention structures during Hurricane Agnes and other natural disasters typifies the quality of SCS design work.

But the past is prologue. We must be constantly alert to incorporate into our work new information, concepts, and skills. We are, along with many people in the natural resource field, taking a closer look at possible nonstructural methods for solving flood-related problems. We are continuing to insist on engineering design work that is environmentally acceptable, and we are placing a higher priority on incorporating esthetic values into all engineering and conservation projects with which we are associated.

Kenneth E. Grant

SOIL conservation

June 1974, Vol. 39, No. 11

Contents

2 *From the Administrator*

4 *A dune is reborn*
by Vincent J. Price

6 *Keeping a Florida subdivision low and dry*
by James N. Krider

8 *Studying soil-plant relationships in Zion*
by Vear L. Mortensen and Lamar R. Mason

9 *Women at work—Outdoors*
by John Cross

11 *Irrigation*

14 *Soil protection for spud production*
by Norris D. Braley and Duane A. Smith

16 *Colorado's high speed test center*
by Rodney Alt

18 *Clean-up of a lake*
by Richard L. Thompson

19 *Flood plains*
by Charles V. Bohart

20 *A new look for Santa Rosa Creek*
by John W. Hanes

21 *Recons*

22 *Reviews*

23 *Meetings*

COVER: The efficient use of irrigation water is one aspect of conservation. Here, a Utah farmer adjusts sprinkler nozzles in his apple orchard. Pomar (dwarf) orchardgrass is a permanent ground cover between trees. For more on irrigation, see centerfold.

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

EARL L. BUTZ, Secretary of Agriculture.

KENNETH E. GRANT, Administrator, Soil Conservation Service

CAROLYN M. JOHNSTON, Editor

MARYELLEN BERTRAM, Editorial Assistant

SOIL CONSERVATION, the official magazine of the Soil Conservation Service, is published monthly by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. Use of funds for printing this publication approved by the Director of the Office of Management and Budget, July 17, 1973.

Reprint permission: Contents of this magazine may be reprinted without permission. Credit is not required but is appreciated. Photographs are available on request.

Commercial names: Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscription: $5.65 per year, $7.10 foreign. Single copy, 50 cents. Discount of 25 percent on orders of 100 or more sent to same address. Order direct from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.



A dune is reborn

by Vincent J. Price
Information Division, SCS
Washington, D.C.

Visitors to the famed art colony of Ogunquit, Maine, were startled this April as they strolled on the beach. Contemplating the bounding main, gulls, the wind, and the dunes, their reveries were disturbed by the unmistakable roar of bulldozers.

Bulldozers? On Ogunquit Beach? Was quiet Ogunquit turning into another Atlantic coast seaside resort of high-rise condominiums? But Ogunquit was supposed to be preserved!

Indeed it was. And Ogunquit Beach will be more than preserved. The dunes of Ogunquit will be restored to a much better condition through the work of the Threshold to Maine Resource Conservation and Development (RC&D) Project. More than half a million dollars of federal funds will go into the project, but local people are confident the investment will be repaid many times over in years to come.

More people, shrinking dunes

The story of the Ogunquit dunes began 70 years ago, when artists and other newcomers first "discovered" the village and its beach. At that time the dunes, more than a mile long, were perhaps 40 to 50 feet high and covered with dense tough beachgrass. In front of the dunes stretched a beach which, at low tide, was 300 feet wide. Behind lay the Ogunquit River, a tidal estuarine area brimming with soft-shell clams.

As the population increased, however, conditions changed on Ogunquit Beach. Sunbathers and other summer visitors began trampling the dunes and inadvertently killing the soil-holding beachgrass. As the grass thinned, stiff ocean breezes lifted the fine dune sands and blew them inland into the river or out to sea.

The dunes began to shrink—slowly at first, then faster. "I've watched these dunes grow smaller and smaller over the last 20 years," says Brad Sterl, a marine resources scientist with the Maine Department of Marine Resources. "The town talked about doing something, but we never could get the money."

Last year . . .

By the summer of 1973, the dunes were almost bare of grass and only 12 feet above sea level. Storms had breached them and the Ogunquit River was choked with sand, smothering acres of clam flats. Visitors decreased when sands whipped along the beach, and millions of dollars of annual income from the tourist trade were endangered.

At that point, Jack Dannert, corporation manager of the Ogunquit Village Corporation, aproached the Threshold to Maine RC&D Steering Committee with the problem. The

committee agreed to fund an RC&D project to control dune erosion, restore a productive shellfish area, and prevent sediment obstruction of the Ogunquit River channel.

The basic plan was to rebuild the dunes to a height of 22 feet and immediately stabilize them by planting beachgrass. Much of the sand for dune rebuilding would come from the bed of the Ogunquit River. This also would restore acres of channel to productive clam beds.

Many voices

The "save the dunes" project caused discussion throughout the state. The Southern Maine Regional Planning Commission advocated its implementation as soon as possible. The Maine Audubon Society advised the planners on wildlife. According to the Society, the revegetated dunes will provide excellent habitat for eastern piping plovers and spotted sandpipers if nesting sites are protected from human disturbance during the breeding season. Eastern least terns and savannah sparrows might also utilize the dunes.

Comments also came from the Rachel Carson National Wildlife Refuge, which abuts the project area, the USDA Forest Service, the Maine Wetlands Control Board, and a dozen other agencies.

The final plan called for all engineering and construction costs to be met by RC&D funds. The local sponsors, the Ogunquit Village Corporation, and the York County Soil and Water Conservation District would pay their own administrative costs, and the village agreed to maintain the dunes at an annual cost of $4,000.

Construction work on the project began this April.

How a dune is built

First, giant "pans" scrape sand off the riverbed and haul it to the beach. Working in tandem, the pans can remove 7,000 cubic yards of sand a day.

As sand fill is being placed in the dune, riprap is laid along 500 feet of the river edge to protect the fill from the tidal currents. A 1-foot thickness of gravel is placed under the riprap to prevent high tides in the river from carrying the fine sand through the rocks and undercutting the shoreline.

Meanwhile, stakes are being laid out along the primary frontal dune and bulldozers are pushing the sand into place. Sidney Emery of the Soil Conservation Service and Brad Sterl of the Marine Resources Department monitored this operation.

"We removed 5½ acres of bar," Sterl reports. "If we can reclaim 3 or 4 acres of that area for clams it will be worthwhile. You can get 200 or 300 bushels of clams per acre a year from these beds, and the current price of clams is $5 to $6 a peck."

Planting a dune

After bulldozers raised the fore dunes to 22 feet above mean sea level, American beachgrass was hand-planted at the rate of 58,000 plants to the acre or more than 1.6 million sprigs of grass for the entire project.

The contractors worked against time because beachgrass can be successfully transplanted only when dormant,



A bulldozer builds up the fore dunes.



Gravel under the riprap protects the sea-sand from tidal currents.



Tough American beachgrass to stabilize the dunes.

which is before May 1. Since they could not start before late April, the plantings had to be made in less than 2 weeks.

Only part of the dune building and grass planting was done during the short working period this year. It will be completed next spring.

The back dune will not be seeded. "In terms of soil erosion, it all ought to be covered with grass," SCS District Conservationist Earland Morrison says, "but a compromise was made to give people a dune area for hiking and painting."

Snow fencing will keep people off the fore dune and the village will patrol the beach. "If you can't keep people off the dunes, you're defeating your whole purpose," says Sterl, "because grass is the main dune stabilizer." Rugosa rose planting will eventually take over pedestrian control duties from the snow fence and will form an attractive natural barrier to protect the dunes.

No guarantee

Planners and conservationists point out that the project has no automatic guarantee of success. Shifting sand is always an uncertain factor. Sterl says, "If you work with a stable inland area putting a pile of dirt down, shaping it, and planting it, it'll stay there. With sand dunes it's different."

But with tough grass forming a protective mat to hold the sand, conservationists hope to restore the dunes to much of their former majesty. As SCS Conservation Technician Emery puts it, "We've got a lot of coastline around here, but it's mostly rocks. Ogunquit has been one of the most beautiful beaches in Maine. We want to keep it that way." ♦

Hundreds of communities needlessly get "wet feet" every time there is a heavy rain.

Examples of these flood-prone subdivisions can be found throughout the country. Often, they are the result of poor site selection or unrecognized soil and water problems.

One subdivision in the Tampa, Florida, suburb of Brandon avoided the "wet feet" problem after its planners and engineering consultants sought soil and water management advice from the Soil Conservation Service. Instead of battling excess water and rising water tables during the rainy season they cooperated—intelligently—with nature.

The result is that subdivision homeowners now have an attractive series of lakes to help their homes stay dry and to make their area more pleasant and less flood prone.

About 2 years ago, when the developer's consulting engineers were beginning design work on the 100-acre site, SCS held a soils and engineering workshop in Tampa, sponsored by the Hillsborough Soil and Water Conservation District. City and county engineers, planners, sanitarians, and private engineers were among the participants.

Members of the subdivision's consulting firm found this information was of direct help to them in developing certain parts of their design. The workshop helped them to better understand and use the published soil survey data and to discover how the site's wetness problems could work for, rather than against, them.

From the workshop information and further contact with the local SCS district conservationist, the consultants were



Keeping a Florida subdivision low and dry

by James N. Krider
Watershed planning party leader, SCS
Gainesville, Florida

able to determine fluctuations in the water table, flooding hazards, soil permeability, and the amount of water storage in the soil profile. They also were able to locate the best sites for excavated, aquifer-fed lakes and for onsite sources of road-fill material.

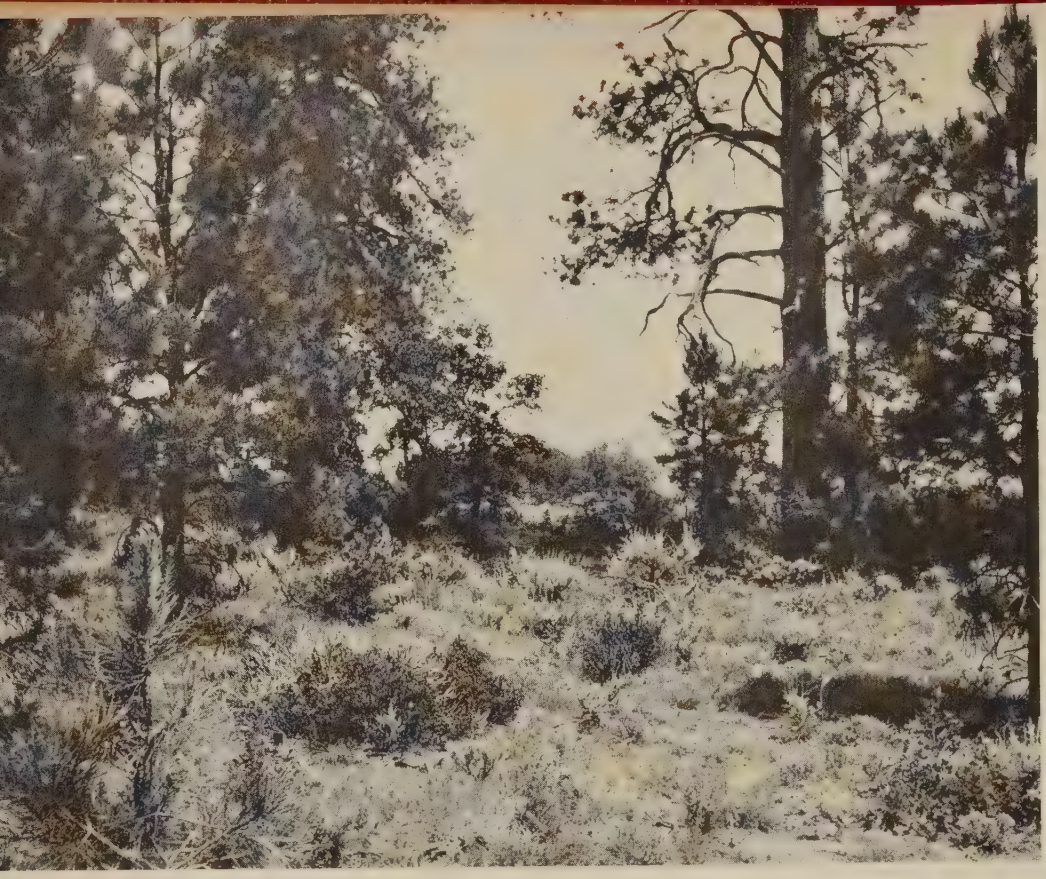
Based on SCS advice, the consulting engineers then designed a system of lakes coupled with a subsurface drainage system.

The lakes provide storage for rainfall and surface runoff, keeping most of the excess water right on the site. Consequently, the flooding potential in downstream areas is significantly reduced.

The subsurface drainage system lowers the natural water table, providing storage of stormwater in the soil profile and decreasing the peak runoff that would otherwise occur. The system also provides some extra benefits including the stabilization of home and roadway foundations and better water management for the owners' lawns, shrubs, and gardens.

The consulting engineer summed it up this way: "This was a chance to apply the drainage concepts, originated by the SCS through years of experimentation on agricultural problems, to the expanding environment of suburban America. It represents the ideal integration of the expertise of government conservation specialists and private engineers in the development of a suburban drainage methodology.

"In this particular project, we feel that the end result of our joint efforts will be a better use of the land to provide housing for a rapidly increasing suburban population while minimizing the adverse impact of suburban development on the environment." ♦



On the trail to Observation Point, Zion National Park.

Studying soil-plant relationships in Zion

by Vear L. Mortensen
Soil scientist, SCS
St. George, Utah
and Lamar R. Mason
Range conservationist, SCS
Salt Lake City, Utah

"In an instant, there flashed before us a scene never to be forgotten. In coming time it will, I believe . . . be regarded as the most exquisite of its kind which the world discloses. The scene was the temples and towers of the Virgin."

Thus wrote Captain Clarence E. Dutton of the U.S. Geological Survey in a report published in 1880.

Captain Dutton was referring to the Virgin River which has cut a spectacular straight-walled canyon through a massive layer of sandstone to form Zion Canyon, the heart of Zion National Park.

Today, the soil-plant relationships of that canyon are being studied.

The average visitor to Zion National Park in southwest Utah doesn't associate the towering red sandstone cliffs and massive bare rock formations with deep soils, growing trees, shrubs, and grasses. But, on the higher terraces and plateaus, accessible only to the more adventurous visitor by four-wheel drive or foot trails, there are beautiful stands of ponderosa pine, Gambel oak, sagebrush, and grasses.

Undisturbed areas like this make excellent locations to study basic soil and plant relationships because the native plant communities have reached a nearly stable climax state.

In 1966, the National Park Service and the Soil Conservation Service agreed to a 10-year study of these so-called relict areas. A special soil survey report was prepared by the SCS, and soil maps and interpretations were presented to the National Park Service for its use.

Another part of the 10-year study has been a joint Soil Conservation Service — Park Service effort to obtain information on the climax composition and yield of native plants on various soil and range sites in the area. Studies have been made in relict areas with such intriguing names as Hepworth Wash, Deertrap Mountain, Potato Hollow, Kolob Canyons, and Checkerboard Mesa.

At each study location, pits are dug to expose soil horizons. Plants growing on each kind of soil are classified and the amount of vegetation is compared with the same year's precipitation. The plant climax is determined by analyzing this and other types of information.

The results of this work have been used in Zion National Park and surrounding areas to make estimates of forage and timber yields and to aid in managing wildlife.

The information will help planners to establish and maintain a stable relationship between soil and plants. It can also be used by park officials to help develop new trails or scenic areas.

Most important, natural ecosystems and natural beauty can be maintained better when we know more about the original soil-plant relationships. If a delicate balance between use and protection is observed, the wonder of the world, known as Zion National Park, can be preserved for generations to come. ♦

Women at work-- Outdoors

by John Cross
Information specialist, SCS
Lincoln, Nebraska



Pamela Kohnken interviews owner of flood damaged property in Prescott, Arizona.

The mud, dust, and sweat of a job outdoors doesn't bother the women conservationists of the Soil Conservation Service. They're more at home jumping ditches than they are juggling deskwork.

Until recently all SCS technical field positions—the "outdoors" jobs—were done by men. But no more! Today, at least 24 boots-and-britches women work as soil conservationists, soil scientists, economists, engineers, or technicians.

Selden Cowan is one "for example". A graduate of the University of Wisconsin agricultural department, she spends her days outdoors digging into the fertile, varied soils of Eaton County, Michigan. To her, soil isn't "dirt" but an alive, fascinating, and basic part of the environment.

Selden's present job is to identify and map hundreds of different soil types so that—as part of the Eaton County soil survey—hundreds of other people can benefit from her knowledge when they use "dirt" to grow crops, build new homes, or for other land uses. She's as familiar with Brookston loam, Hoytville clay, and other soil types as most women are with cooking or cosmetics.

Roberta (Bobbi) Stevenson of Arizona specialized in agronomy when she attended the University of Arizona. Her first SCS job was as an agronomy assistant developing and testing grass varieties. She did all the other chores required, including harvesting and cleaning seed and hoeing weeds. Today, she's a soil conservationist at the SCS field office in Yuma, Arizona, helping farmers and ranchers apply soil and water



Susanne Leckband operates transit for vertical control on drainage project.

conservation practices to their lands.

Mrs. Susanne Leckband of Colorado is an agricultural engineer who surveys and designs ponds, irrigation systems, and erosion control structures.

Peg Whiteside is a soil mechanics engineer working in Madison, Wisconsin. She tests soils, in both field and laboratory, to determine their suitability for use in dams and other structures.

Pam Kohnken gets involved in the economics aspects of watershed and river basin work in Phoenix, Arizona. A graduate of the University of Denver, she is currently taking night courses at Arizona State to earn a master's degree in economics. Wading in mud to gather data after floods have occurred is a common assignment.

How well are women accepted in jobs traditionally held by men? "Farmers very soon see me as a person," says Susanne Leckband, the agricultural engineer. Gil Landtiser, Selden Cowan's soil survey supervisor, says he doesn't care what sex his soil scientists are, as long as they do high quality work. Selden does.

The women agree they like being outdoors. But sometimes their job takes them to schools, garden clubs, and other organizations that want help on environmental matters from the Soil Conservation Service. Selden says that, whereas most women slip into slacks or shorts to relax, she puts on a dress.

How do these outdoor-oriented women relate to the traditional female values of home, marriage, and children?

Susanne is a wife and mother with a "very interesting" husband and a daughter Michel Ray. Just before Michel was born, she had to stand back a bit from the surveying instrument, but that was the only necessary adjustment. She is, also, the only SCS field technician ever to take maternity leave.

Marriage and children don't interest Peg at the moment, while "that comes later," says Selden.

Choosing a career in conservation was easy for most of them. Susanne likes the people, the work, and the challenges. Bobbi wants to be ready for greater responsibility when the time comes. And Selden says she doesn't expect to be boring holes in the soil all her life but does want to continue in some capacity as a soil scientist.

All of the women appreciate being treated like ladies. Yet their men supervisors don't hesitate to send them out into mud or snow to get a job done—and they appreciate that too.

The women add that there's little time to think about "being different" because the conservation job is so demanding it absorbs their eight to five energies. They become absorbed in the problems of erosion, sedimentation, and environmental problems as their male colleagues do.

And—as with men—there's always soap and water to solve the problems of mud, dust, and sweat at the end of the day. ♦

IRRIGATION



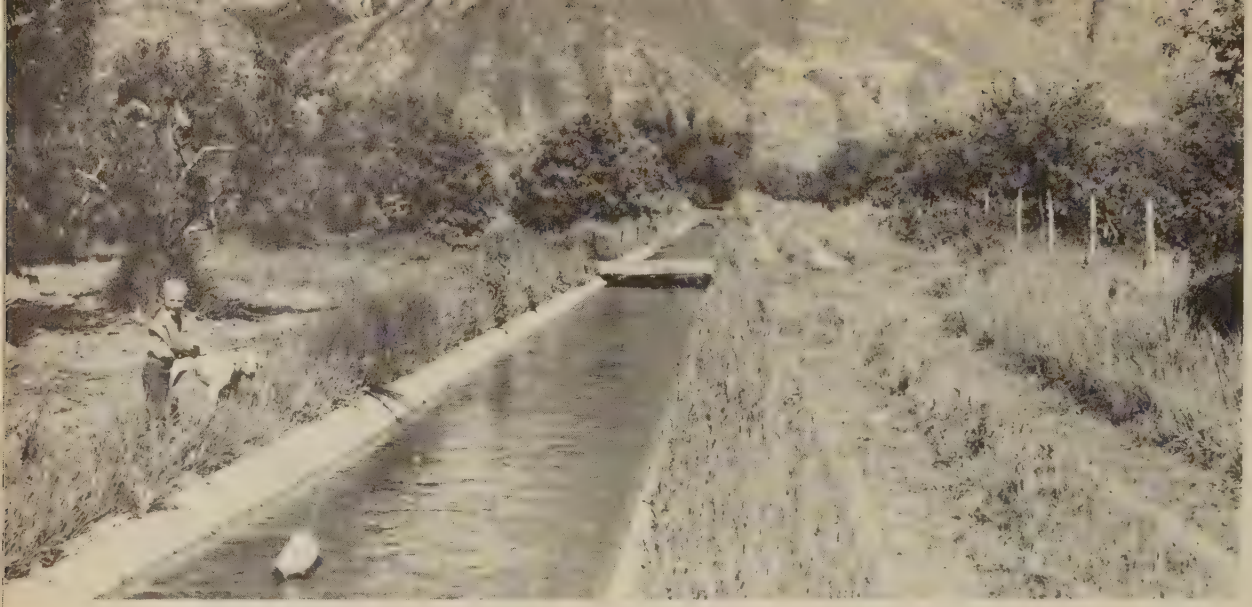
Since before recorded history, man's desire to make dry land "bloom like a rose" has triggered interest in irrigation systems. Today, about 10 percent of U.S. land in cultivation is under some form of irrigation. In the 10 western states, about 80 percent of water consumed—not used but consumed—goes for irrigation use.

There are a number of irrigation systems, adapted to different climates, terrains, cropping systems, or soil conditions. Some systems are thousands of years old, while others incorporate sophisticated 20th century techniques to provide more coverage with less water wastage.

In the United States, about 78 percent of all irrigation is done by surface methods and about 22 percent by sprinkler systems—but the number of sprinkler irrigators is increasing. Soil Conservation Service engineers and soil and water specialists help farmers and ranchers to design, adapt, and use the most suitable methods for their land.

For examples of irrigation methods, please turn the page. ♦

From the initial water source, to the main irrigation canal, to the smaller supply ditches or sprinklers, down to the farmfields, truck gardens and orchards, irrigation water flows, spurts, or squirts in many different ways to its ultimate destination. Here a "ditch rider" in Lyon County, Nevada, works a headgate to start irrigation water on its way to someone's land.



A Utah farmer's main irrigation ditch is used by his son to sail a boat. Smaller ditches run across the field at right angles to the main ditch and siphon tubes transfer water from there to the crops.



Furrow irrigation (left) in Lompoc Valley, California. Siphon tubes bring water to this field of carrots. The amount depends on size of the tubes and difference in elevation between irrigation ditch and furrow. This method is adapted to any row crop. On rolling land, contour furrows—curved to the land—are used.

Drip irrigation (below left) keeps plant root zone moist but not saturated to reduce water waste and soil erosion. The dripper, shown here, provides a slow, steady release of water. The method is used for high-value crops, such as these California avocado trees, in areas with high water costs, rough terrain or problem soils. It's also adapted to home gardening and landscaping.

Contour basin (below right). Dirt borders, that follow the contours of the land, are scooped out and basins flooded with water. The technique is old but effective.







A circle sprinkler irrigation system (above) on Oregon wheatland. Nozzles direct water downward to reduce the effect of wind. The system can be set to irrigate 138 acres in either 11 or 22 hours. Because of control over water drift, this irrigation method is sometimes used to dispose of treated sewage effluent.



Right, border or "flood" irrigation in Reeves County, Texas. The irrigator is turning on openings in a gated pipe which is attached to a hydrant behind him. The hydrant connects surface pipe to an underground pipe under the dirt ridge. Other ridges, perpendicular to the pipeline, separate the farmfield into long strips—anywhere from 15 to 200 feet apart—for ease in irrigating. This picture was taken in early spring and shows a field prior to planting.

A center pivot sprinkler irrigation system in Cochran County, Texas. These systems make a complete 360° circle over a field in a set period of time. Many are 1,200 feet long with towers (see right) and sprinklers every 100 feet, and can irrigate a half mile in diameter, or approximately 130 acres, in one complete revolution. Some systems have a trailing boom which straightens to irrigate corners in a square field. Here, a technician checks pressure of the "big gun" sprinkler nozzle. Too little pressure means not enough water for crops and possible soil compaction; too much breaks water into fine particles that are blown away. Over 1½ million acres of land are irrigated this way.





Soil protection for spud production

by Norris D. Braley
District conservationist, SCS
Presque Isle, Maine
and Duane A. Smith
Extension economist
University of Maine

Potatoes are a profitable crop this year and farmers in Aroostook County, Maine—a top potato-growing area—have no complaints about that. They're increasing total potato acreage—but they're doing it the right way this time.

Risk — hard going — that's potato farming. In the past, good farmers could count on a profit from their crop only 2 years out of 10. Farmers who survived this attrition are understandably anxious to produce more now that prices are up. But as they produce more, farmers are also protecting their land more, thanks to an all-out campaign to promote good crop rotation.

At one time most Maine potato farmers did alternate their crops. Often they operated a small livestock enterprise and would plant part of their land to grain for feed.

During World War II, however, an all-out effort to produce potatoes stimulated farmers to try continuous cropping. This continued after the war and the results were devastating to the land.

The biggest problems occurred in central Aroostook County, an area covered by the Central Aroostook Soil and Water Conservation District. The land is rolling, with highly erodible soil that is fairly shallow to bedrock. Studies made in 1940 and 1964 indicated that some fields had lost 20 inches in 24 years. And this was on land that had no soil to waste in the first place.

Soil Conservation Service conservationists warned that one-crop farming was causing irreparable damage, but many farmers felt they couldn't afford to change. They were living too close to foreclosure already, and a further loss in income might mean the end of any farming at all.

Two years ago the Central Aroostook SWCD, the Soil Conservation Service, and the Cooperative Extension Service tried a new approach—an all-out campaign to explain why crop rotation was more profit-

able than the old one-crop system.

Assisted by the Agricultural Stabilization and Conservation Service and the Production Credit Association, SCS and Extension people barnstormed up and down the county speaking to farmers in terms of dollars and cents. Television shows were produced, news stories written, radio spots broadcast, and more than 50 group meetings held. The Maine Potato Council joined with USDA agencies to advocate crop rotation.

Meanwhile, the Extension Service worked on better methods of marketing the grain or hay used in crop rotation. Some farmers felt the only benefit from rotation was a higher yield of potatoes the following year. But new markets were found for wheat, buckwheat, and oats; so a man now can make a modest profit from harvesting these soil-stabilizers —and get a better potato yield the next year as well.

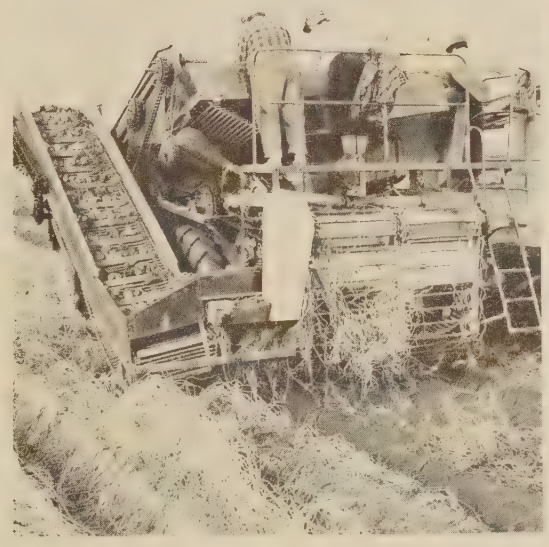
Potato farming is an expensive operation, costing several hundred dollars an acre each year. Unfortunately, the margin between the cost of producing an acre of potatoes and the prices the farmer receives for them is so narrow that a farmer may spend hundreds of dollars to raise an acre of potatoes, get hundreds of dollars for the potatoes, and still only break even, or maybe even lose money.

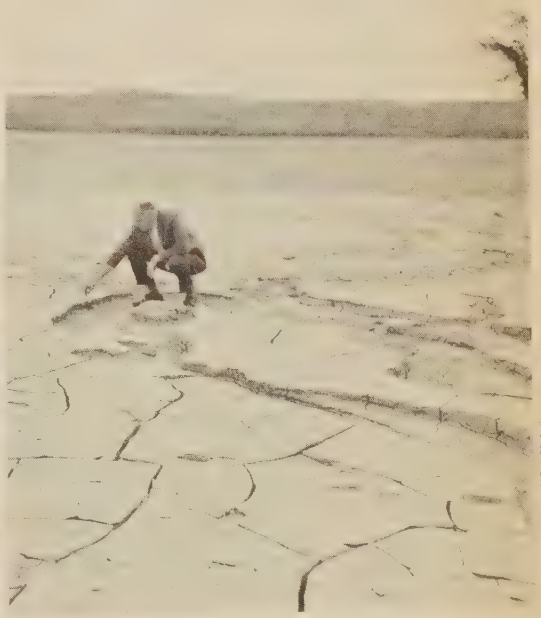
Crop rotation results in a better yield per acre of potatoes in those years when the land goes into potatoes. Thus, a farmer can produce more potatoes per acre without a significant increase in per-acre production costs. This provides him with a greater profit margin at less risk. It may mean the difference between making $75 an acre on 100 acres—or losing $25 an acre on 200 acres.

The experience of farmer R. H. McLaughlin illustrates a related benefit. "I was planting 110 acres a year to potatoes and wasn't making ends meet," he remembers. "I cut it down to 50 acres a year and now I'm making a living. Quality is the big difference. When you harvest a crop, if you can bag and sell it without losing a third of it as poor quality to the factories, then you can make it."

"Increased quality is a natural from rotation," reports Arnold Davis of Potato Service, Inc., a Maine based processing enterprise. "When you plant potatoes year after year, the soil becomes compacted under the weight of the machinery. This causes uneven potato growth. With rotation, you get

continued on p. 16







Silt accumulation at the bottom of eroded potato field (far right). (Next), potato harvester in operation. Potatoes are separated from stones and vines, then transferred to large truck. (Bottom), stripcropping on Aroostook potato field.

a loose, friable soil that lets the tuber grow to its natural size."

Other benefits of rotation are:

—It reduces soil erosion.

—It reduces or eliminates several potato diseases such as silverscurf, scab, and early blight.

—It results in improved water intake into the soil, conserving moisture for any dry periods in late summer.

—The soil has more tilth and works more easily.

Nature also helped convince Aroostook farmers of the need for soil conservation. "Up to 10 years ago the overall average potato yield would be 164-180 pound barrels per acre," reports farmer Charles Knight. "But then we began to see diminished yields. I think farmers are beginning to agree that rotation is necessary for good long-term crop results."

This year hundreds of requests are coming from the farmers of central Aroostook for technical assistance with crop rotation, indicating that 1974 may be a banner year for conservation.

The results will be more potatoes, less soil erosion—up to 50 percent less—and a better living for the farmers. And the trend seems likely to continue.

"Within the next 3 or 4 years, you'll see a big difference in farming methods here in Aroostook," predicts farmer R. H. McLaughlin. "More rotation, more barrels an acre, and better quality potatoes. With good crops and a decent yield, a man can pay his bills and live the way he should." ♦

train-ing for conservation?

Colorado's high speed test center

by Rodney Alt
Area conservationist, SCS
Sterling, Colorado

High speed commuter trains, which may some day connect our major cities, are now being tested in a remote area of eastern Colorado, where the only communities are prairie dog towns.

The High Speed Ground Test Center is a unique facility encompassing 50 square miles of native rangeland. The Center, operated by the Federal Railroad Administration (FRA) of the Department of Transportation, is testing new long-range rail vehicles, some of which will attain speeds of 300 miles an hour.

The Center is also used by the Urban Mass Transportation Administration to test intracity trains.

The Federal Railroad Administration became a cooperator with the Turkey Creek Soil Conservation District in 1970 and requested SCS assistance in revegetating the sandy track rights-of-way on the test grounds. This resulted in the revegetation of approximately 250 acres of land.

FRA's project monitor, Ross Gill, was quick to realize that the 30,000-acre test center contained a wide variety of natural resources. He knew some major management decisions had to be made and he conferred with SCS specialists on the problems and possibilities.

For example:

The productive Colorado rangelands making up the Center produce enough forage annually to feed from 7,000 to 9,000 cows or their animal equivalents. If the land is not grazed, the large accumulation of dry forage can become a serious fire hazard. What's the answer?

The land is also home to a variety of wildlife species, including antelope. How would the high speed train testing affect them?

what will the prairie dogs say?



Prairie dogs inhabit three large towns of 640, 400, and 60 acres on Center land. A planned rail line will traverse the largest prairie dog town. What will the ecological repercussions be?

Some areas of the proposed development have complex soils and hydrologic conditions; these must be taken into account. And wind erosion can become a serious hazard on disturbed land areas because the soils are sandy—and the winds are of a high velocity.

Two years ago, the Federal Railway Administration entered into a reimbursable agreement with SCS to receive technical assistance on which to base a long-range conservation plan for the Center. The agreement includes provisions for onsite assistance by SCS in developing and applying sound conservation practices.

In 1972 and 1973, SCS resource specialists prepared a series of natural resource inventories for the Center. These can provide a basis for sound future planning.

The resource inventories include information on climate, soil, vegetation, wildlife, geology, historic and archaeological values, recreation opportunities, hydrology, and revegetation potentials.

The Colorado Forest Service evaluated fire hazards and the requirements for an adequate fire control system.

The Colorado Division of Wildlife assisted in inventorying the Center's wildlife and made recommendations concerning the future management of wild animals.

The decisionmakers of FRA are presently evaluating the possible ways in which they can plan for the Center's future development.

Both FRA and SCS are optimistic that when the final decisions are made a sound conservation plan will be completed to protect the Center's facilities and make the best possible use of its resources.♦



Rodney Alt (left) and Ross Gill look over conservation plan for the test center.

Clean-up of a lake

by Richard L. Thompson
RC&D Project Coordinator, SCS
Kemmerer, Wyoming

Lake Viva Naughton, about 15 miles north of Kemmerer in southwest Wyoming, has been both a boon to fishermen and a headache to nearby ranchers. Now, thanks to community cooperation, camping and ranching can be good neighbors.

One reason for this turnabout was the help provided by members of the Western Wyoming Resource Conservation and Development Project (RC&D) in the area.

Lake Naughton is on the Hams Fork River which runs through the small city of Kemmerer. In 1941, Kemmerer built a dam across Hams Fork River, creating a 100-acre lake for municipal water storage. It was open to everyone for fishing and remained open until 1960 when it was closed due to water pollution and a general degradation of the nearby area.

In 1962, the Utah Power & Light Company constructed a much larger dam across the Hams Fork River a mile above the city dam. This created the new 1,458-acre Lake Viva Naughton. It was used for water storage and fishing also.

Lake Viva Naughton's reputation for yielding "big ones" spread, and fishermen flocked into the area. But, once again, pollution became a serious problem.

Local ranchers lost patience—along with thousands of dollars—when fishermen drove cars, trucks, and campers through their grain and hay fields. Because there were few camping facilities, visitors stopped for the night under the willows, along the lakeshore, or at any wide spot in the access road. And when they left for home, garbage and other refuse was strewn around the once-beautiful river and lakeshore.

The ranchers had only one choice left to protect their land; they fenced off a major part of the Hams Fork River shoreline.

the lake had big fish but the land had even bigger problems. it was being trashed to death.

At the same time, Utah Power and Light threatened to close the large lake to visitors because of pollution problems.

The city of Kemmerer, Utah Power & Light, and some of the ranchers considered two possible ways to rejuvenate the lake. One was to develop a public recreation area administered by the community; the other was to look for a reliable concessionaire.

The first idea was tried, but problems arose over which community group should administer the lake area.

Next, two Wyoming residents proposed that they operate the Viva Naughton Marina concession. The two men promised to save the lakeshore and develop the lake to full recreation use—if the community helped them overcome pollution problems.

The RC&D and the Lincoln County Conservation District provided conservation and land use planning assistance. Soil Conservation Service specialists and field office personnel surveyed area soils, revised a number of separate conservation plans of landowners, incorporated the ideas of local people into plans for the marina, and drew up an area-wide conservation plan.

RC&D people also provided help on standard designs for buildings, boat ramps, and restroom facilities. And the Wyoming Game and Fish Department stocked the lake with 110,000 rainbow trout fingerlings.

In the spring of 1973, construction began on the marina. A well was dug, a complete sewage and garbage system was set up, and the entire area was fenced to keep out litterbugs. A cafe, showers, and other amenities were also completed.

In the first year, some 12,000 visitors have used the marina and camping facilities. As many as 500 campers remain at the lake overnight. Future plans call for A-frame summer houses to be built and rented, and an expansion of the lake itself.

The operation has boosted Kemmerer's economy, through increased sales of fishing gear, groceries, and other supplies. And, while a fee is charged to use marina facilities, campers seem to feel it's more than worth it. Their problem lake is now a popular recreation spot.♦





Top, the playground looked this way Friday, but (2nd) like this on Sunday—free of water and ready for use. (Left), a low point in the access road is under water, but 2 days later there's no evidence of water and no damage.

FLOOD PLAINS

PLAINS can be problem areas unless you accept the fact that they will periodically flood.

Homes built on flood plains can be wrecked or washed away, causing major financial and personal losses to homeowners. But there are other land uses—often including recreation—where flood losses can be minimal. Playgrounds, trails, and low-use roads, for example, are often among the better uses for flood plains.

These pictures, taken in Holmes Park, Lincoln, Nebraska, during and after a heavy rainstorm, illustrate this point. —By Charles V. Bohart, *recreation planner, SCS, Lincoln, Nebraska.* ♦





A new look for Santa Rosa Creek

by John W. Hanes
Engineering technician, SCS
Santa Rosa, California

Santa Rosa Creek is getting a face lift. And the fish couldn't be happier!

Severe bank erosion along Santa Rosa Creek, through Santa Rosa, California, is part of the reason. Earlier attempts to stop erosion by dumping trash and rubble concrete on the banks only made a public dump of the area—as well as "trashing up" the water for the steelhead trout which travel the creek en route to their spawning grounds upstream.

Clearly, Santa Rosa Creek had a problem.

The Central Sonoma Watershed Project provided the answer. Cosponsors of the project were the Santa Rosa Resource Conservation District and the Sonoma County Water Agency. They worked closely with the Soil Conservation Service and specialists in the California Department of Fish and Game, the U.S. Fish and Wildlife Service, and the Santa Rosa Planning Department.

Results? The new channel bottom has a 2-foot slope on one side to deepen summer flow. Four- to six-foot-wide boulders, placed at 40- to 50-foot intervals, make resting areas for fish migrating upstream during winter runs. The boulders also cause small gravel bars to develop, improving the stream's fish-oriented environment.

Fish shelters in the creek bottom help protect migrant fingerlings from predators. And fishways were constructed through hazardous areas.

Careful placement of rock riprap and brooming of the grout help avoid an artificial paved appearance. Planting wells are stocked with low maintenance plants that attract wildlife. Views from five bridges and a city park were considered in placing trees and shrubs.

A sprinkler system supports the vigorous plant growth and keeps it green. The city of Santa Rosa donates irrigation water and the Sonoma County Water Agency maintains the plantings. And the steelhead trout swim upstream and spawn successfully, unaware that Santa Rosa Creek's new look has helped them on their way. ♦

Tropical plants booklet goes worldwide

Major land use changes have come to the U.S. Virgin Islands in the last decade. New housing developments and new industries have increased such urban-oriented problems as denuded soils and uncontrolled water runoff.

What to plant to replace the bulldozed foliage became a high priority matter with local environmentalists. Lush, colorful vegetation isn't difficult to grow in the Caribbean climate; but, there are problems in knowing what plant is best for a specific area, how much salt tolerance a plant has, and how much moisture it requires.

Henry Williamson, former SCS district conservationist in the Virgin Islands, needed a publication that answered these questions. Williamson, his talented secretary, Carol Smith, and soil conservationist — photographer William Saalman combined their talents to produce a colorful new booklet "Selected Virgin Island Plants."

The 48 page booklet provides an authoritative guide to tropical plants for ground cover, barrier hedges, privacy screens, and windbreaks. The Virgin Island Soil Conservation District arranged for the Virgin Island Landmark Society to finance the printing costs.

Now in its second year of publication, the booklet has sold more than 1,700 copies. The same publication, under the title "Selected Tropical Plants" has sold 8,000 more copies in Florida, the West Indies, and South America.—By Gordon S. Smith, *information specialist, SCS, Upper Darby, Pennsylvania.* ♦

Recon . . .

The American Society of Planning Officials (ASPO) is currently involved in a research project dealing with the local approach to the regulation of sensitive environmental land areas. The project planners hope this will result in a handbook for local planning agencies that will identify possible regulatory approaches in the preservation or conservation of fragile land areas. The particular areas of concern are salt and fresh water wetlands, hillsides, streams and creeks, woodlands, and aquifer recharge areas. ASPO officials are interested in receiving information concerning "inputs" into effective local regulations or information on such regulations now in force. Interested readers can write to William Toner, American Society of Planning Officials, 1313 E. 60th St., Chicago, Illinois 60637.

Flax buffer strips on summerfallow protect land from wind erosion, especially during "blow days." This is the experience of Triangle Farms, Langdon, North Dakota, which had wind erosion on summerfallow acres in the fall and spring during the period of snow loss and the beginning of spring work. This "critical period" can damage land because the soil structure has been broken down by the freezing and thawing process. Field windbreaks of three rows of flax spaced 28 feet apart cover about 500 acres of summerfallow. If weeds become a problem, the land between can be cultivated. Use of the flax strips resulted in less wind erosion on the fallow acres and a more uniform snow cover, resulting in additional moisture.

Woodsman, spare that kenaf: a 10-foot tall member of a type of hibiscus may provide pulpmills and paper manufacturers with the "tree" of the future. The kenaf doesn't look like a tree or act like a tree, but USDA Agricultural Research Service researchers believe that the hardy hibiscus may share one very important characteristic of some trees: it provides an excellent fiber for paper manufacture. Growing to maturity in 4 months, compared to 20 years for many trees, the kenaf (pronounced kuh-NEF) produces five to seven times more pulp per acre per year than the pine tree. After 16 years of research effort to locate a suitable fiber substitute for trees, USDA scientists have zeroed in on the kenaf; honeysuckle and milkweed were two alternatives that were found unacceptable. Now scientists are working to eliminate a root parasite—the root-knot nematode—from the kenaf. If the parasite can be eliminated, the kenaf has the potential to supply some of America's increasing paper needs while preserving forest lands.

FACE for Wildlife is a new 4-H contest designed to establish food and cover for wildlife in Tennessee, announces James Byford, University of Tennessee wildlife specialist. "FACE means Food and Cover Establishment," explains Byford. Contestants' plots will be judged in October. The top three winners in Tennesse will each receive an engraved plaque, plus cash awards of $300, $200, and $100. Urban as well as rural 4-H members are encouraged to participate."

USDA plans five regional workshops on land use planning to stress the role of agencies in agriculture and land grant universities in this field.

These discussion conferences will be held between June and September 1974. Key USDA agency leaders will meet to consider the role of several agencies, including SCS, in providing information, and in working with other agencies and groups in a coordinated effort to help local people solve land use planning problems. The workshops are sponsored by the Department's Committee on Planning and Policy for Land Use and Land Conservation, established by Secretary's Memorandum 1807.

Review

Increasing Crude Protein Content of Forage with Atrazine on Shortgrass Range. By W. R. Houston and D. H. van der Sluijs. *1973. USDA Production Research Rpt. 153. 10 pp., illus. with graphs and charts. $0.25.* Atrazine is well known for its herbicidal action on annual grasses and forbs. Houston and van der Sluijs report the chemical is also able to increase crude protein concentration in many plants and may increase yields.

Annual Technical Conference Proceedings of the Sprinkler Irrigation Association. *1973. (13975 Connecticut Avenue, Suite 310, Silver Spring, Maryland 20906). 99 pp., illus. $8.* Presentations by industry and government specialists discuss a variety of topics including waste disposal system concepts, waste effluent research, sprinkler irrigation design concepts, and future agricultural systems.

Effect of Physical Soil Properties on Cotton Emergence—Prediction and Quantitative Description. By D. F. Wanjura. *1973. USDA Tech. Bull. 1481. 20 pp., illus. with graphs and charts. $0.30.* A wide range of conditions encountered during planting season across the Cotton Belt are detailed in this mathematical model for simulating emergence. Physical soil properties—temperature, moisture, soil physical impedance, planting depth—and their effects on cotton emergence are explained.



Soil surveys

Michigan

Emmet County. By Stanley D. Alfred, Adam G. Hyde, and Richard L. Larson. *1973. Soil Conservation Service in cooperation with Michigan Agricultural Experiment Station. 99 pp., illus.; maps.*

Mississippi

Pontotoc County. By H. C. Lane, W. E. Bright, M. C. Tyer, and W. I. Smith. *1973. Soil Conservation Service and Forest Service in cooperation with Mississippi Agricultural and Forestry Experiment Station. 72 pp., illus.; maps.*

New Mexico

Lea County. By Millard T. Turner, Dellon N. Cox, Brice C. Mickelson, Archie J. Roath, and Carl D. Wilson. *1974. Soil Conservation Service in cooperation with New Mexico Agricultural Experiment Station. 89 pp., illus.; maps.*

Hidalgo County. By Dellon N. Cox. *1973. Soil Conservation Service and Forest Service in cooperation with New Mexico Agricultural Experiment Station. 90 pp., illus.: maps.*

New York

Chemung County. By Carl S. Pearson, Russell A. Parsons, Norman B. Hulbert, Jr., and Wilfred C. Williams. *1973. Soil Conservation Service in cooperation with Cornell University Agricultural Experiment Station. 100 pp., illus.; maps.*

Pennsylvania

Susquehanna County. By Earl J. Reber. *1973. Soil Conservation Service in cooperation with Pennsylvania State University, Agricultural Experiment Station and Agricultural Extension Service, and Pennsylvania Department of Environmental Resources, State Soil and Water Conservation Commission. 89 pp., illus.; maps.*

South Dakota

Davison County. By Warren F. Johnson, James E. Kirk, Kenneth Miller, and Grayson E. Murphy. *1974. Soil Conservation Service in cooperation with South Dakota Agricultural Experiment Station. 70 pp., illus.; maps.*

Lake County. By Loren D. Schultz and James L. Driessen. *1973. Soil Conservation Service in cooperation with South Dakota Agricultural Experiment Station. 78 pp., illus.; maps.*

Tennessee

Meigs County. By Robert B. Warren. *1974. Soil Conservation Service in cooperation with Tennessee Agricultural Experiment Station. 71 pp., illus.; maps.*

Vermont

Chittenden County. By George W. Allen. *1974. Soil Conservation Service in cooperation with Vermont Agricultural Experiment Station and Vermont Department of Forests and Parks. 149 pp., illus.; maps.*

Washington

King County Area. By Dale E. Snyder, Philip S. Gale, and Russell F. Pringle. *1973. Soil Conservation Service in cooperation with Washington Agricultural Experiment Station. 100 pp., illus.; maps.*

Columbia County. By Eveard T. Harrison, Fred R. McCreary, and Frank L. Nelson. *1973. Soil Conservation Service in cooperation with Washington Agricultural Experiment Station. 88 pp., illus.; maps.*

Wisconsin

Fond du Lac County. By Ernest G. Link. *1973. Soil Conservation Service in cooperation with University of Wisconsin (Department of Soil Science), Wisconsin Geological and Natural History Survey, and Wisconsin Agricultural Experiment Station. 115 pp., illus.; maps.*

Deep tillage can break up most man-made soil pans, says George J. Buntley, University of Tennessee Extension specialist. "Subsoiling and chiseling are used on a wide range of soil conditions in Tennessee," says Buntley. "Deep tillage is practiced on soils free of pans, with natural pans, and with man-made pans. It can also greatly improve plow and traffic pans."

Meetings

June

2–5 *American Institute of Chemical Engineers, Pittsburgh, Pa.*
4–6 *International Exposition and Seminar on Water Resources Instrumentation, Chicago, Ill.*
5–6 *Keep America Beautiful, Inc., Birmingham, Ala.*
9–13 *Air Pollution Control Association, Denver, Colo.*
16–19 *National Watershed Congress, Pittsburgh, Pa.*
16–19 *American Institute of Biological Sciences, Tempe, Ariz.*
16–21 *American Water Works Association, Boston, Mass.*
16–21 *Ecological Society of America, Tempe, Ariz.*
23–26 *American Society of Agricultural Engineers, Stillwater, Okla.*
23–27 *National Environmental Health Association Annual Educational Conference, Cincinnati, Ohio*
24–26 *American Plywood Association, Portland, Oreg.*
24–28 *American Society of Civil Engineers National Symposium on Water Quality Planning, Ithaca, N.Y.*
24–28 *American Society for Testing and Materials, Washington, D.C.*
26–30 *Association of Consulting Foresters, Ocean Shores, Wash.*
28–July 3 *National Education Association, Chicago, Ill.*
29–July 3 *American Seed Trade Association, Inc., St. Paul, Minn.*
30–July 2 *American Society of Farm Managers and Rural Appraisers, Inc., (Summer Meeting), Boise, Idaho*
30–July 4 *American Society of Landscape Architects, Bal Harbour, Fla.*

July

1–2 *National Symposium on Water Resources Problems Related to Mining, Golden, Colo.*
8–17 *Second International Drip Irrigation Congress, San Diego, Calif.*
13–17 *American Association of Nurserymen, Inc., Toronto, Canada*
14–17 *National Association of Counties, Miami, Fla.*
16–17 *Keep America Beautiful, Inc., Colorado Springs, Colo.*
17–19 *Izaak Walton League of America, Huntington, W. Va.*
21–25 *Federation of Business and Professional Women's Clubs, Inc., Chicago, Ill.*
23–25 *National Conference on Flood Plain Management, Washington, D.C.*
25–26 *Great Plains Agricultural Council, Sioux Falls, S. Dak.*

August

11–14 *Conservation Education Association, Syracuse, N.Y.*
11–14 *National Farm and Power Equipment Dealers Association, Minneapolis, Minn.*
11–14 *Soil Conservation Society of America, Syracuse, N.Y.*
12–20 *Tenth International Congress of Soil Science, Moscow, U.S.S.R.*
14–16 *American Society of Civil Engineers, Irrigation and Drainage Conference, Biloxi, Miss.*
18–21 *American Institute of Chemical Engineers, Salt Lake City, Utah*
18–21 *American Agricultural Economics Association, College Station, Texas*

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D. C. 20401

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300
AGR 101

POSTAGE AND FEES PAID
U. S. GOVERNMENT PRINTING OFFIC

MOVING? Send present mailing label and new address, including zip code, to Division of Public Documents, U.S. Government Printing Office, Washington, D.C. 20401.



June is busting out all over—including this irrigated Texas cornfield.

.6
035
Cop. 2

SOIL conservation

U. S. Department of Agriculture / Soil Conservation Service / July 1974



STANDING TALL IN IOWA—page 4

CLIFFHANGING in HAWAII—page 9

Where it's at

The Department of Agriculture is no stranger to land use problems, conflicts, and decisions.

The Soil Conservation Service and other USDA agencies have been helping local people make decisions about the use of land for many years.

Through education, persuasion, and incentives we have encouraged land users to protect and conserve soil and water and to improve farm and ranch management. We have helped to prevent floods in rural areas. We have helped to plan and build hundreds of new lakes and millions of new ponds. Through Resource Conservation and Development Projects we have worked to improve numerous aspects of rural and small town life and land use. And this by no means exhausts the list of examples.

It would not be stretching things to describe the Department of Agriculture as America's original land use agency. A major reason is that USDA works directly with the people who own and manage more than half of America's land—the nation's farmers and ranchers.

USDA is a source of resource facts second to none in the land use field. SCS for example is directly involved in soil surveys, river basin studies, snow surveys, range site surveys, and an enlarged inventory of the nation's conservation needs. We are working to strengthen our land inventorying and monitoring. Task forces are now at work on definitions of prime agricultural, grazing, and forest lands. New procedures for monitoring erosion and sedimentation work also are being developed.

SCS specialists help to interpret our information on soil, water, and other resources so that farmers and urban planners can readily apply it to their own work.

And SCS, along with its sister agencies in the Department of Agriculture, has the delivery system to facilitate the movement of new information from the office or laboratory out to the land and landowners. The same system brings invaluable field experience quickly from the countryside into the Washington conference room.

We work, too, on improving our delivery system. The aim is better coordination among federal agencies, more understanding relations with individuals and organizations involved in land planning, and broader contacts with the general public.

Information delivery is a two-way street. While we are working to make our information available, we must listen carfully to land users and planners and the public at large to make sure we understand their needs and interests.

Land use planning has always been a basic part of good farming and ranching. Farmers and ranchers will continue to be among the major architects of future land use policy. They should be fully represented in all planning councils so that their knowledge and experience can benefit all Americans.

Kenneth E. Grant

SOIL conservation

July 1974, Vol. 39, No. 12

Contents

2 From the Administrator

4 A green future for prairie grasses?
by John Maddy

6 Prefabs for phoebes and barn swallows
by Gene A. Whitaker

8 New Mexico plants a great idea
by Tom Anderson

9 Mystery of the falling cliffs
by Max S. Coray

10 Growing grass on rock
by Leroy E. Werchan

11 Park planning is no picnic!
by J. Kent Hortin and Ivan L. Lines, Jr.

12 Taking a shot at archery golf
by Gordon C. Postle

13 Producing cattle on grass
by Dick Barber

14 A community fights erosion
by Gene Warren

15 Growing more of everything
by David S. Mackey

16 Report from the Virgin Islands
by William G. Saalman and Carol F. Smith

18 Diagnosing the Great Lakes
by Gerald B. Welsh

19 Building a data base
by Elmer F. Sauer

20 Recon

21 Review

22 Soil surveys

23 Meetings

COVER: Soil Conservation Service employees at work on a watershed project near Dixon, California. District Conservationist Denis G. Nickel sights the level assisted by Soil Conservationist Jack R. Carlson.

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

EARL L. BUTZ, Secretary of Agriculture.

KENNETH E. GRANT, Administrator, Soil Conservation Service

CAROLYN M. JOHNSTON, Editor

MARYELLEN BERTRAM, Editorial Assistant

SOIL CONSERVATION, the official magazine of the Soil Conservation Service, is published monthly by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. Use of funds for printing this publication approved by the Director of the Office of Management and Budget, July 17, 1973.

Reprint permission: Contents of this magazine may be reprinted without permission. Credit is not required but is appreciated. Photographs are available on request.

Commercial names: Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscription: $5.65 per year, $7.10 foreign. Single copy, 50 cents. Discount of 25 percent on orders of 100 or more sent to same address. Order direct from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

A green future for prairie grasses?

by John Maddy
Agronomist, SCS
Des Moines, Iowa



Can native prairie grasses, which once abounded and fed wild buffalo, be cultivated for cattle grazing?

Soil conservationists and farmers in Iowa are looking for the answer by performing tests on switchgrass, indiangrass, big bluestem, and other warm season grasses native to Iowa. The Soil Conservation Service Plant Materials Center at Elsberry, Missouri, is supplying most of the seed for the field trials. Farmers have seeded more than 1,000 acres of the grasses so far, mostly in southern Iowa. And the results are encouraging.

Proper Cultivation

Most of the native grasses of Iowa grow fastest during the warm—or hot—summer season. When reintroducing these warm season grasses, the idea is to grow them in a separate pasture from cool season grasses. Farmers report it takes 30 to 40 percent as much warm season grasses as cool season for a balanced pasture program. When production of bromegrass, orchardgrass, and other cool season grasses begins to taper off in early July, warm season grasses, which green up in May, are 1½ to 2 feet high and ready to graze. These native grasses will produce as much forage in July and August as cool season grasses yield early and late in the grazing season. And they'll support the same number of cattle.

The use of warm and cool season grasses in a grazing program helps to stop overgrazing by cattle, an important benefit to conservation-minded farmers. Warm season grasses should not be grazed closer to the ground than 10 to 12 inches which leaves quite a protective canopy! And since the grasses are grazed only 2 months out of the year, they appear to have great potential as wildlife habitat and nesting cover.

Yearling cattle grazing on switchgrass in Union County, Iowa.

Weeds can be a problem in establishing stands. Using a herbicide in mid-May to control weed growth gets the grasses off to a good start. The use of fertilizer in late May, when warm season grasses can make the best use of it, helps established stands.

Vote of Confidence

Dr. Thomas McMillan, physician and farmer near Leon, Iowa, is optimistic. "I was surprised to find no native grass pastures in Iowa when I moved here from Nebraska. I think they'll work here. But you can't overgraze them."

Bill Rountree, plant materials specialist at the SCS Plant Materials Center at Elsberry, Missouri, believes warm season grasses haven't worked in the past because they were not managed well and were grazed to the ground. Rountree has helped guide and evaluate the field trials of prairie grasses in Iowa for about 5 years.

Merlin Bintz of Minden who has had 30 acres of native grass for 5 years expresses his views this way. "What pleases me is to see my cows content under shade trees on a hot summer day when other cows are out in the hot sun looking for food."

Dean and Lyle McCunn of Red Oak who have seeded about 30 acres report no problems in getting their cattle to eat the native grasses. "The yearlings grazed the switchgrass really well," Dean says.

Others May Benefit

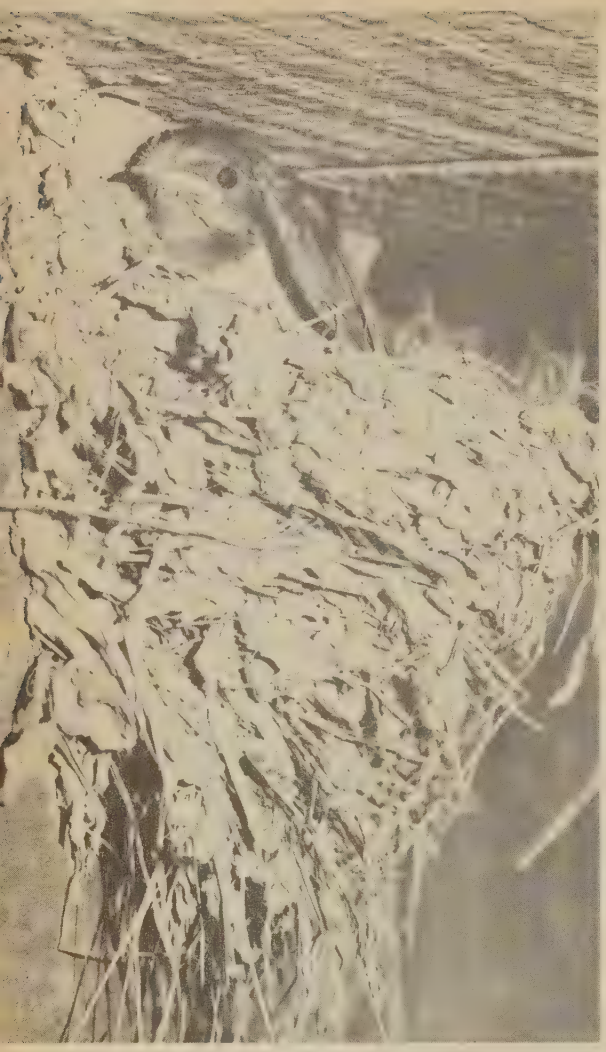
Cattle may not be the only ones who enjoy native Iowa grasses. The Chariton Valley Resource Conservation and Development Project is conducting a field test to see whether these grasses are equally rewarding to quail, pheasants, and other wildlife. The Iowa Conservation Commission, Lucas, Wayne, and Appanoose Soil Conservation Districts, the Army Corps of Engineers, the SCS, and several farmers are working together on it.

Ten 10-acre plots have been planted to native grasses around Lake Rathbun, an 11,000-acre recreation pool. SCS has provided technical help and some of the seed as well as information on cattle stocking rates and grazing lengths. The Iowa Conservation Commission provided the rest of the seed, labor, equipment, fertilizer and chemicals. They also arranged with private landowners to graze the pastures at the rate of two cattle an acre during the summer grazing season.

Commission biologists are evaluating the pastures as nesting areas for quail and pheasants. During future summers they will analyze each of the the 10 experimental areas before mid-July. They'll obtain data on nesting densities and the success rates of nests of bobwhite quail and ringnecked pheasants.

Prospects Are Promising

So far, then, the news from Iowa on the use of native warm season grasses is good. They don't cure pasture problems. And they can't replace cool season grasses. Instead of feast in June and famine in August, however, integration of warm and cool season grasses holds a promise of a steady year-round diet for cattle. ♦



The old neighborhood is changing, but this worried-looking barn swallow can still find a place to nest.

PREFABS for PHOEBES and BARN SWALLOWS

by *Gene A. Whitaker*
Biologist, SCS
College Park, Maryland

Cave, bungalow, lair, nest — every living creature needs a home. But what do you do if you're a bird and "progress" rips out the old homesite?

If you're lucky, the progress-bringers help you find a new one.

The barn swallow and the phoebe are two birds which long ago abandoned their natural nesting habitat in caves and under overhanging cliffs for the security of manmade structures. They attached their mud-and-grass nests to the rough beams of old wooden barns or the underside of wooden bridges. There they raised their young and took off on their daily flights to forage for the flies, beetles, and other insects which plague the farmer and home gardener.

Yet today these valuable birds are losing their homes. Wooden barns are becoming scarce and the old wooden bridges of rural America are being torn down and replaced by cheaper, smooth-surfaced pipe or box culverts.

The culverts improve roadways and drainage ditches for people, but the barn swallow and phoebe find it difficult to attach their nests to the slick-sided metal or concrete.

As a Soil Conservation biologist, I decided to do something about the problem. I started by looking under numerous bridges to see what the birds themselves preferred as a home.

I found that most barn swallows and phoebes nested on narrow shelves at least 5 inches below the roof of the bridge. Only one or two phoebes would be under the same bridge; a large number of barn swallows would live under one bridge, but always at least 6 feet apart.

So I designed an inverted T-support structure to duplicate these nesting conditions as closely as possible (see drawing).

The general design for use in round culverts is a 2- by 6-inch piece of rough lumber about 2 feet long. This is nailed down the center by a 1- by 8-inch wood support about 2 feet long. This gives a narrow shelf with its "head" pointing upstream and tail downstream to minimize any hangup of debris from a major flood. The design, incidentally, is the general shape of a barn swallow in flight.

Another design is used for square box culverts or concrete bridges. Here, a 2-inch by 2-inch square board a few feet long is attached to the side of the culvert or bridge. It's placed about 6 inches from the top.

In the summer of 1972, the Division of Soil and Water Conservation of Delaware's Department of Natural Resources and Environmental Control made 26 of these new structures and tested them in six different locations.

The first four went into a newly installed set of 60-inch corrugated metal pipes, which had replaced an old wooden bridge. When workers returned to the site 4 days later, barn swallows had nested in three of the structures and were already laying their eggs.

Last year, 19 of the 26 mod "birdhouses" were used by barn swallows or phoebes. Every nesting site had birds, although not every structure was used.

The wooden nesting structure is attached inside the top of new culverts as the culverts are installed. Nails were first used to hold them to the pipes, but large screws are now preferred. A hole is drilled in the concrete pipe and an expandable anchor is inserted and attached to the nest with a pair of small metal angles and screws.



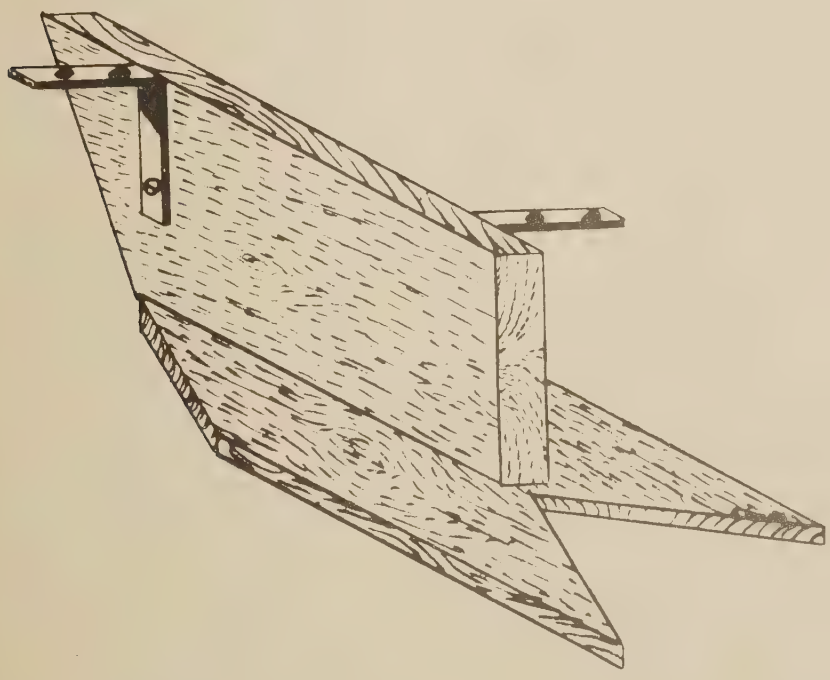
At home in Culvert Heights.

The structures are safe from normal mammal or reptile predators, and the possibility they will be flooded out is small if the culverts are designed according to good engineering standards.

Delaware has made it a statewide policy to install these or similar structures in all new culverts. Bird lovers in Maryland and New Jersey are working for a similar program.

There's also an attractive private citizen aspect. Boy and Girl Scouts or other conservation-minded people can help by building and installing these structures in existing pipes or culverts; highway departments should be happy to give your group permission. The Soil Conservation Service in Maryland can provide the design. The expense is low and the satisfaction high.

There's room for everyone in the environment — even if you're only 3 inches tall and plan to live in a culvert. ♦



The basic design.

In many ways . . .

New Mexico plants a great idea

by Tom Anderson
District conservationist, SCS
Silver City, New Mexico

A year ago you couldn't buy native New Mexican plants in New Mexico nurseries. Plants like rubber rabbitbrush, yucca, sacahuista, desert willow, New Mexican forestiera. Now you can because students at the Southwest New Mexico School for the Handicapped are growing and selling the first native plant stock to be certified for sale in New Mexico.

The idea came from the Southwest New Mexico Resource Conservation and Development (RC&D) Council, which matched up requests for help from two groups to solve the problems of each.

One group, the Southwestern New Mexico Services to Handicapped Children and Adults, Inc., near Silver City, New Mexico, wanted learn-by-doing opportunities for its handicapped clients at the school.

Another group, the local chapter of the American Association of University Women, wanted to see a commercial source of native New Mexican plants established. The women felt that native plants could be used in landscaping because they are showy, colorful and unusual, and require little, if any, watering.

To get the project going, RC&D project coordinator Bob Abercrombie contacted the Board of Supervisors of the Grant Natural Resource Conservation District. At the Board's request, the Soil Conservation Service furnished soil information, helped identify suitable plant species, and drew up a conservation plan which specified the necessary land preparation, water and fertilizer requirements, and fencing, planting and harvesting procedures.

Abercrombie also asked a business research class at Western New Mexico University to study the need for, and supply of, native plants. The class discovered that there was indeed a significant demand for these plants. They also discovered that none of New Mexico's 263 nurseries offered native plants for sale, that no native plants were certified by the New Mexico Department of Agriculture, and that laws prohibit removing such plants from federal land.

Barbara Gray, an official of the School for the Handicapped, chose a 1-acre tract near the school for a nursery.



Barbara Gray and Bob Abercrombie admire a rabbitbrush plant.

A. A. Valerio was appointed director of the program. This left only one problem: how to secure seed and initial stock that could be certified by the State Department of Agriculture.

The SCS Plant Materials Center at Los Lunas, New Mexico, had already developed improved strains of several native plants. They were ready for certification and release but someone—or some group—was needed to grow the plants commercially. Through the Grant Natural Resource Conservation District, plants and seeds were secured for the School for the Handicapped.

At the Los Lunas Plant Materials Center, Mr. Valerio learned more about handling nursery stock. Then, under his supervision, boys from the school constructed a 9-foot-tall woven wire fence to protect the new plants from wildlife damage. They also prepared the land for planting, irrigated and harvested the seed, and learned how to pot the young plants for market.

After less than a year of operation, the nursery is a success. Requests for the yucca, desert willow, and other shrubs come from schools, airports, the state highway commission, and many businesses and individuals.

Native southwestern plants are making a comeback—and helping handicapped people do the same. Colorful plants and concerned people are providing young New Mexicans with nursery management skills that can lead to a worthwhile occupation in future years. ♦

MYSTERY of the FALLING CLIFFS

It's no riddle how a pounding ocean surf could erode away the lower cliffs at Paukaa, on the coast of the Big Island of Hawaii. Much more mysterious was the slow erosion of the upper part of this cliff next to a U.S. Coast Guard lighthouse.

The Coast Guard asked the directors of the Mauna Kea Soil and Water Conservation District to find out why the upper part was continually eroding and how they could stop or slow the process.

Soil Conservation Service technicians pointed out the unusual properties in the soil at the top of the cliffs. Once dried, the soils cannot absorb moisture. Instead, they shrink dramatically and fall apart, flaking off the cliff like scales from a dead fish and exposing a deeper soil layer to the same process.

Armed with this information Coast Guard officials followed a district recommendation to reshape the eroded area into a less steep bank. Then they planted dwarf pangolagrass developed at the SCS Hawaii Plant Materials Center. Fertilizer was used in each planting hole and is still applied two or three times a year because of the soil's low natural fertility.

Today, stands of the dwarf pangolagrass keep the soil at the top of the cliff from completely drying and flaking off and also help to beautify the area.—Max S. Coray, district conservationist, SCS, Honokaa, Hawaii. ♦



Preparing an eroded clifftop for planting.

Growing grass on rock

by Leroy E. Werchan
Soil scientist, SCS
Austin, Texas

How do you grow grass on a barren rock quarry?

With difficulty—that's how.

The United States Gypsum Company's New Braunfels, Texas, office gave it a try, with help from their local soil and water conservation district. And today, they've established a dense stand of natalgrass, Selection 75 kleingrass, Kleberg bluestem, johnsongrass, weeping lovegrass and buffalograss.

Delbert J. George, the company's works manager at New Braunfels, said the company hopes to revegetate the same amount of land yearly that they disturb in their quarry operations—about 10 acres.

"We want to repair the ugly scars of mining, clean up the stream nearby, and bring more wildlife back to the area," said George. "We think we can do it—but it sure isn't easy."

George and SCS District Conservationist R. B. McDonald began the job 2 years ago. McDonald knew there were no cut-and-dried methods for growing grass on the steep sides and rough bottoms of the limestone rock quarry. So he experimented.

McDonald and SCS plant specialists picked a tough test site for their first try. It was an 80-foot-high crushed-rock slope that tilted at a 45° angle.

First, most of the area was bulldozed to a 20° angle. What couldn't be altered was left in a steep slope, then covered with a few truckloads of soil. Most of the soil promptly tumbled down the hillside, but enough remained in place—about half an inch—to give some hope the steep area could be "greened up".

Then, McDonald got 21 varieties of grass seed from an SCS plant materials center and —for almost 2 days—he and United States Gypsum employees planted the grasses in small separate test plots. Some of the newly planted seed was fertilized, some was only mulched, and some seed plots were both fertilized and mulched.

As spring of 1972 came around, a number of grasses sprouted. Things looked promising until a torrential May rainstorm devastated much of the test site and only a handful of grasses survived. Interestingly, most of them were on the ½-inch topsoil covering the steepest slopes.

Although the heavy rains and subsequent soil erosion ruined most of the first year plantings, the fact that even some grass survived in this hostile environment was so heartening that SCS and the mining company decided to make another try in 1973.

Last year, more soil was added to the quarry area—a reddish, noncalcareous, gravelly clay soil that came from the mine surface. A 2- to 4-inch layer was spread over the area washed out in 1972, and part of the steepest area was smoothed to a more gentle slope.

The results were excellent. Luxuriant, dark green, waist-high grasses sprang up to cover what—a few months before—had been gray, crushed rock surface. Even the slope with only a scant ½-inch of soil had a dense cover of green. "I wish," said mine official Delbert George, "that we had planted 40 acres instead of 4."

Which of the 21 grasses on trial won the blue ribbon? Natalgrass—an African import—made the best growth, while the others were strong runners-up.

Turning the quarry green is costing United States Gypsum about $600 an acre—but they feel it's money well spent. Their grass does more than look beautiful. It's healing the earth's scars, making local creeks run cleaner, and bringing back the wild deer and turkey. ♦

Park planning is no picnic!

by J. Kent Hortin
District conservationist, SCS
and Ivan L. Lines, Jr.
State biologist, SCS
Salt Lake City, Utah

Good recreation land around big cities that hasn't already been gobbled up by developers often carries a premium price tag. The area around Salt Lake City, Utah, is no exception. This makes it tough to be in the shoes of Gary Swenson, director of the Salt Lake County Parks and Recreation Department.

Swenson believes the energy shortage will result in a greater demand for local recreation areas. Vacations for Americans in the future are likely to include fewer long distance car trips and more use of recreation facilities within walking, bicycling, or short driving distance of their homes.

"We're not sure how we'll meet this increased demand, but we are sure that we'll have to be more selective in our acquisition and development plans. We'll be leaning quite heavily on the Soil Conservation Service to help us with new site selection and development," Mr. Swenson said.

One way to provide more nearby recreation areas and avoid the high land costs, says Swenson, is "to develop school grounds with a more park-like setting. They could function as school grounds, local parks, and picnic areas, as well as being part of the school's environmental education program. We could satisfy more of the demand for recreation with little extra expense for either the schools or the Salt Lake County Parks and Recreation Department. To this end, we will make our landscape architects available to interested schools."



The Soil Conservation Service helps park and recreation planners by providing them with soils information about their land and water. Recently SCS provided soil survey reports and interpretations on Utah's Little Cottonwood Regional Park.

This kind of information alerts planners to possible problems such as unstable soils —highly undesirable for volleyball courts, cabins, or other buildings which may eventually crack or shift. It shows planners where they may face soil or water problems when they plan for drainage, irrigation, or septic tank filter fields. Preventing land use mistakes can save the taxpayer hundreds of thousands of dollars in repair or renovation bills.

Soils information and other on-site assistance also is valuable in helping planners choose new park or school areas; in designing useful and attractive ponds or wildlife areas; and in selecting the best grass, shrubs or trees for durability, easy maintenance, erosion control, and beauty. And that's just a start!

Swenson is pleased with SCS help in his plans to bring more recreation opportunities to the people of Salt Lake County. "Cooperation with the Soil Conservation Service, particularly in recent years, has been excellent. I don't know why we didn't get together sooner." ◆

(Photograph courtesy of the Utah Travel Council.)

Taking a shot at archery golf

by Gordon C. Postle
Executive Secretary
Licking County, Ohio
Soil and Water
Conservation District



For 32 years, Charles Minnich engineered trains from Columbus to Pittsburgh to Wheeling to Zanesville and back again. Watching the Ohio - Pennsylvania - West Virginia countryside roll by, he often dreamed of a place to call his own.

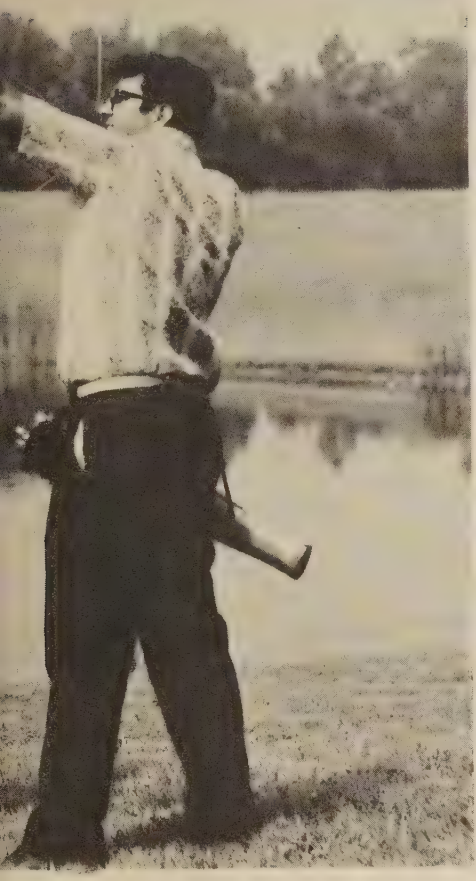
In 1958, his dream came true when he purchased a 175-acre farm in the rolling hills of Licking County, Ohio.

A champion bow and arrow archer, Minnich became intrigued by the new game of archery golf and decided to build a pay-for-play course on his farm. He turned to the Soil Conservation Service for help on setting up the course, using soil survey information and on-site advice from the local district conservationist.

"Planning a farm for outdoor sports is pretty common," said Minnich, "but an archery golf course is so new there aren't many guides to follow except what the land itself tells you. I believe I have the second archery golf course ever built in this country."

What is archery golf? It's similar to regular golf except that it's played with a bow and arrow instead of clubs.

"You begin play by shooting an arrow from a tee-off area along a fairway toward the green," said Minnich. "When your arrow hits the green, instead of putting, you try to knock a soft plastic ball, about



Charles Minnich, left, and friends tee off for a round. An SCS-designed pond is in the background.

4 inches in diameter, from its perch with a specially designed arrow. Naturally, the fewer shots to drop the ball the better."

The archery golf ball is held in place by a 4-inch high wire tee. The course itself is 4,500-yards long, with 18 fairways and accompanying tees and greens.

Besides his archery golf course, Minnich has added a 3-acre lake to the farm and stocked it with fingerling bass, bluegills, and channel catfish. It's an attractive water hazard as well as a home for white-tail deer and migrating wood ducks.

A rustic clubhouse and a camping and picnic area also are part of the package.

"All of my decisions on how to use the land were based on the capability of the land," says Minnich. "I learned this commonsense approach by working with the Licking County Soil and Water Conservation District."

Minnich combines practicality with a willingness to experiment with new ideas. He's tried sheep on the golf course to cut down on grass mowing. And his rustic two-story clubhouse-home is made of untreated utility cedar poles salvaged from the city of Columbus, Ohio. Some of the clubhouse panels are made from cedar boards sawed from the poles. Minnich calls it his cedar attic chest, adding that "we've never been troubled by moths."

Minnich updates his conservation plan annually as part of his effort to "do right" by the land. He may add another fishpond to be used by Boy Scouts in the area.

Minnich, a world champion archery golfer, recently published a book on the subject and plans to begin an archery golf instruction school.

In the meantime, visitors to Minnich's recreation farm come early, stay late, and return often. With arrows in the air, a rustic clubhouse in the woods, and the quiet of rural Ohio around them, they're enjoying a welcome retreat from 20th century living. ♦

"Like a love affair"

Producing cattle on grass

American farmers and ranchers are being urged to produce more food and protect more land at the same time. Veteran Colfax County, New Mexico, rancher and conservationist Ed Salyer believes there's more than one way to do that.

"For years I was a wheat farmer on my 700 acres," says Ed Salyer. "But there were always problems with the wind and weather. If I did have a good wheat crop, I'd likely get hailed out. So, several years ago I planted all the land back to grass—bought $4,300 worth of seed at one time."

Asked if he would break his land out to crops again, Ed Salyer answered without hesitation, "If wheat went to $10 a bushel, I still wouldn't plow out my grass and clover."

What's his best grass?

"Western wheatgrass," he answered. "I can get a foot of snow and my cattle still graze it. When I first seeded to grass, the government program that helped pay the cost required me to mix a soil-building legume with the grass seed, so I added yellow blossom sweet clover. I'm mighty glad I did.

continued on p. 14

continued from p. 13

"I thought at first my cows wouldn't eat that tall clover after it cured, but they sure do. They almost look like feedlot stock.

"We farmers need to produce more food, but in my part of New Mexico, with its unpredictable weather, grass will outproduce any crop. And it protects the soil. We don't have soil blowing now and very little washing."

Establishing a good stand of grass requires more than seeding the right kinds. You need to use your land and water the right way too.

"You can overstock grassland with too many cattle and get along for a few years," says Salyer, "but you can't stay in business that way. Grass is like a love affair. If you take, you've gotta give. So my pastures get a rest in the spring or summer.

"As for water—I have an old playa lake bed. Before I built levees around it, the lake would catch so much water it drowned out some of my grass. Then when the land dried up, I had blowing dust. Now, my levees keep water out of the lake bottom and I can use that water to irrigate 100 acres of grass. I do this with a couple of 3-inch pumps and some portable pipes.

"Of course, I don't get enough water to irrigate every year — only when it rains enough that runoff water is available. And the lake bed itself is grassing over now."

Soil and water conservation is alive and well—and producing more beef—on Ed Salyer's ranch.—*Dick Barber, information specialist, SCS, Albuquerque, New Mexico.* ♦

A community fights erosion



Note exposed tree roots on bare school ground before the school and community tackled erosion problems.

by Gene Warren
Information specialist, SCS
Alexandria, Louisiana

"That grass is wonderful. It keeps the mud off the outdoor basketball court," said Glenn Wilkins, principal of Martin High School in Red River Parish, Louisiana, as we looked at the grassy slopes on his school ground.

Wilkins could be justly proud, because it was his teachers and students who sparked a green-up and cleanup program for the school grounds. And conservationists are also happy because the grass cover means less soil erosion.

Much of the school campus is built on sloping land, and the grass once was scanty. After student feet had pounded the ground bare, heavy rains would wash the soil away. Large tree roots became exposed, adding another hazard to the playground.

The "green-up" project started with Mrs. Minnie Maxie, natural resource teacher at the school. She asked Alvy Slatten, Soil Conservation Service district conservationist, to talk to her eighth grade class about conservation. Later, Slatten suggested that the class break up into groups and make

an inventory of conservation problems on the school ground.

"The response was good," Mrs. Maxie said. "The students reported that one problem was the large amount of erosion. We wrote Mr. Slatten asking that he come back and show us what we could do about it."

After a discussion with Principal Wilkins, permission was given in early 1972 to begin a conservation project.

The SCS district conservationist suggested ways to shape and terrace the ground and plant the grass. The parish police jury volunteered their equipment to level eroded slopes. The International Paper Company gave topsoil for the bare spots. Cattleman Olin Holly gave 15 bales of hay for mulch; the Holly Springs Baptist Church loaned their sprinkler system to irrigate the grass; the Red River Valley Experiment Station supplied the grass sod; and the SCS furnished no-mow bermudagrass sprigs.

Three kinds of grass were used. Tufcote bermudagrass was planted in heavily used areas, since it can stand a great deal of foot traffic; shade-tolerant no-mow bermudagrass was planted under trees; and common bermudagrass was planted on other areas. The Red River Parish School Board bought the seed and fertilizer.

The grasses passed their school test, and officials say the pounding the Tufcote bermudagrass has taken is unbelievable.

"Where we planted Tufcote beside common bermudagrass, you can see the difference very clearly," Principal Wilkins said. "Everywhere we planted the Tufcote the ground is in better shape, especially around slides and drinking fountains. Since the ground gets packed down hard after a year's playing, we will disc the area this summer so the grass can get a new foothold.

"We also used a terrace to divert some of the water that used to run onto the play area," Wilkins added. "This was especially beneficial while the grasses were forming a sod."

Everyone in town is pleased at the improved appearance of the Martin High School grounds. Mrs. Phyllis Cole, teacher at the school, said, "The playground used to be so rough the children had little usable space in which to play. Now, they can run around without tripping over tree roots, and they don't get as dirty because they have the grass to roll on."

But the story doesn't end here. Mrs. Maxie's eighth grade class has adopted the school ground as their outdoor conservation classroom project and class members pick up litter and keep the whole area looking better. As Mrs. Maxie notes, "we stopped soil erosion, got a better campus and had a real learning experience for the students all from the project." ♦

Growing more of everything

Jim Herd of St. Louis, Missouri, is an attorney, hunter, fisherman, nature lover, and part-time farmer. Combining his interests, he's made soil and water conservation work the law of the land on his 363 acres. It's paid off in:

—more and better corn and soybean crops
—better trees for timber, beauty, and birds
—fishing for food and fun, and
—more, and more varied, wildlife.

Two years ago, when Jim Herd bought his farm in northeast Missouri, he became a cooperator with the Knox County Soil and Water Conservation District. He worked with the local SCS district conservationist on how to do more for—and with—the land.

Mr. Herd decided to keep 129 acres of bottomland in crops, put 24 acres in pasture, and to use the remaining 210 acres for woodland production and wildlife habitat. He also renovated two old ponds to grow bass, bluegill, and channel catfish.

Mr. Herd followed the standard conservation practices for his farm crops. To increase wildlife, he provided annual food plots for quail and rabbits; built brush piles for winter cover; planted pine, autumn olive and black walnut trees; fenced out livestock from most of the area; kept the wooded marsh areas for wood ducks and cleared off part of a ridge top to create new "edge" and other browse areas for deer and turkey.

Jim Herd is convinced that wildlife, like corn or soybeans, is a crop from the land. Keep the land and water in good shape, he says, and you'll attract plenty of desirable visitors.—*David S. Mackey, district conservationist, SCS, Edina, Missouri.* ♦

Report from the Virgin Islands



Specialized footings are needed for this St. Thomas shore site.

Once called "the poorhouse of the West Indies" by President Herbert Hoover, the U.S. Virgin Islands now have the highest per capita income in the Caribbean. In a single decade, jet-age transportation has turned a rural agrarian economy into a tourist- and industry-oriented land of growing prosperity. But the resulting strains on the three major islands of St. Croix, St. John, and St. Thomas have been tremendous.

The islands are volcanic in origin with many steep slopes and "difficult" soils for building purposes. In the early 1960's, many land developers were ecologically unsophisticated about the problems they faced. One result was increased soil erosion, water pollution, and related problems. Floods became more frequent and more of the land's surface and ground water ran off into the sea, adding to a critical water supply problem. The marine environment suffered as large amounts of mud and sediment were deposited on beaches, ocean reefs, and other low-lying areas.

The Virgin Islands Conservation District was acutely aware of these problems. With technical help from the Soil Conservation Service, they moved to protect the 132 square miles making up the three islands. Through their early efforts, and with help from others, the Virgin Islands Environmental Protection Act was passed in March 1971.

The crux of the law is the Earth Change Permit, which must be obtained before approval to build is given. The permit is issued by the Virgin Islands Conservation District for builders on private lands. The Virgin Islands Department of Conservation and Cultural Affairs issues the permit for public lands.

A developer or property owner must agree to:

- Fit his development to the topography and soils as closely as possible.
- Save trees and other natural vegetation wherever possible.
- Avoid unnecessary disturbance of the soil.
- Install permanent storm drains and roads as early as possible.
- Protect denuded soils with

by William G. Saalman
District conservationist
and Carol F. Smith, SCS
St. Croix, Virgin Islands

mulch where permanent protection is delayed.

- Install permanent vegetation immediately after final grades are established.
- Use sediment basins where needed.
- Provide for proper water disposition. This may involve direct disposal or retention.
- Schedule construction operations so as to expose only the area of land that can be developed in a reasonable length of time; and
- Develop any sites located in natural recharge areas so that the site's overall capacity for recharge and storage of ground water is not diminished.

To date, 1,357 permits for development on private land have been issued by the Virgin Islands Conservation District, and 33 permits for public land changes have been issued by the Virgin Islands Department of Conservation and Cultural Affairs.

The St. Croix field office of the Soil Conservation Service has been impressed by the increased efforts of developers and landowners to incorporate conservation measures into their planning from the start. This reversal of the "hit and run" bulldozer techniques of previous years has resulted in the introduction or increased use of such concepts as cluster development, fitting new buildings to the natural topography of an area, and better methods of storm water management.

One reason for the jump in conservation practices is early work by the Virgin Islands Conservation District. Before the Earth Change Permit became a requirement, SCS and District people helped bring together members of the construction industry, conservationists, and local government people to hammer out the guidelines for an environmental protection handbook. This was published before the law went into effect in late 1972 and helped educate the public on the changes.

Hardheaded businessmen and developers are discovering that the extra money needed to apply good conservation measures not only improves the appearance of their developments, making sales and rentals easier, but also protects their long-range investment. ♦

The Virgin Islands are implementing a recently passed (1973) zoning regulation. This defines more clearly how land may be used. The Legislature and the Planning Office are considering revisions in the present subdivision law which will provide for more comprehensive controls over land to be subdivided. The proposed changes require developers to submit a copy of their approved earth change plan. Thus, the earth change permits are complementary to both the new zoning regulations and the proposed new subdivision legislation.

Earth Change Permit Number 1. A step in the right direction.



Diagnosing the Great Lakes

The Great Lakes are the largest body of fresh water in the world. They cover an area of almost 100,000 square miles and have a drainage basin three times that size. On their extensive shorelines—more than 3,500 miles long in the United States alone—are the cities of Milwaukee, Chicago, Detroit, Cleveland, Buffalo, and Toronto. They are a major transportation artery and an important source of water-based recreation to the 35 million people within the basin.

In short, the Great Lakes form one of the most important resources of the North American continent.

To insure more protection of the Great Lakes, the United States and Canada signed the Great Lakes Water Quality Agreement in 1972. One of its provisions is that the already existing International Joint Commission "enquire into and report upon pollution of the boundary waters of the Great Lakes system from agricultural, forestry, and other land use activities, in accordance with the terms of reference attached to this agreement." The terms of reference, paraphrased, ask the following questions:

1) **Are the Great Lakes being polluted by ground and surface runoff from various land uses?**
2) **If so, to what extent, by what causes, and where?**
3) **What remedial measures would help to substantially reduce this pollution and what would it cost?**

An International Reference Group on Great Lakes Pollution From Land Use Activities was set up to answer these questions. The reference group includes United States and Canadian experts from state, provincial, and both federal governments. Norman A. Berg, Associate Administrator of the Soil Conservation Service, is United States cochairman of the group; his Canadian counterpart is Dr. Murray G. Johnson, an eminent limnologist with the Canada Centre for Inland Waters.

The first phase of the study, a state-of-the-art assessment of the problems, is nearly completed, with SCS supplying the erosion and sedimentation portion. The second phase, an inventory of land uses, is well underway, using Earth Resources Technology Satellite (ERTS) data. This latter work is being done at Purdue University's Laboratory for Application of Remote Sensing, with field checks by SCS technicians.

The next job is to monitor the flow from several selected watersheds within the Great Lakes Basin. The watersheds were chosen to include a variety of soil types and land uses.

The final task, before specific answers to the questions of pollution cause and control can be formulated, is to diagnose the degree of impairment of water quality from pollutants carried into the lakes from the land.

The study, scheduled for completion in 1977, should provide much of the information needed to make rational land use decisions in the Great Lakes Basin.—*Gerald B. Welsh, Resource Development Division, SCS, Washington, D.C.* ♦



Shoreline erosion along Lake Huron.

Building a data base

The public's ability to make rational land use decisions, either directly or through elected officials, depends on its knowledge of land and water properties and limitations. Environmental decisions need to be based on solid data concerning the nature, characteristics, and geographical distribution of an area's natural resources.

Most towns and cities in the United States do not possess comprehensive data on their soils, water, vegetation, or wildlife. Until recently, this was true of Passaic Township, New Jersey. Yet few areas needed such information more.



Passaic Township Environmental Commission members review soil survey information. Left to right: Mrs. Elizabeth Frasier, Lester L. Seglin, SCS field resource conservationist, and Mrs. Ann Morris.

Passaic Township is essentially a suburban community within the heavily populated metropolitan corridor stretching down the Atlantic seaboard from Boston to New York, Philadelphia, Wilmington, Baltimore, and Washington, D.C. The life of the township has been heavily influenced by economic and population pressures.

In Passaic Township, these man-made pressures have run into serious natural resource constraints.

The northern section of the township forms part of the Great Swamp and is an important migratory bird habitat. Fifteen hundred acres in the southern part of the township lie on the Passaic River flood plain. Both of these facts place serious obstacles in the path of extensive land development.

To determine the nature and extent of such natural constraints, the Passaic Township Environmental Commission organized a volunteer project to chart and inventory the natural resources of their township. More than 50 local residents were volunteer workers. Funds for the program came from the township, and technical assistance was provided by the Morris County Soil Conservation District.

Using Soil Conservation Service data and information from the county's soil survey, a series of color-coded maps helped to illustrate such critical soil-related properties as depth to bedrock and how this relates to whether certain areas are suitable for heavy buildings, roads, or other uses. These maps were augmented by another series showing important social and historical aspects of the land.

More effort went into gaining information on the area's climate and geologic formations and its water, wildlife, and vegetative resources. All of this culminated in a 50-page book on the natural resources of the township.

With the maps and book as a guide, volunteers made "on the land" observations of the remaining undeveloped land in Passaic Township. The area was divided into a number of sections 10 acres or more in size. Each section was visited by two volunteers who recorded soils and other information about the area. All of this went into the final inventory.

Although designed principally for use by the township government, the Passaic inventory is also helpful to local schools and to private land developers. The project has stimulated similar work elsewhere in the state.—*Elmer F. Sauer, district conservationist, SCS, Morristown, New Jersey.* ♦

U.S. farmers comprise less than 5 percent of the population. But they have production assets exceeding $300 billion, spend $64 billion in 1 year to pay production expenses, pay property taxes of more than $3 billion a year, and have close to an $80 billion debt load that is expected to double within 10 years.

One out of five jobs in the United States is related to agriculture, and at the heart of this is the American farmer.

Agriculture is the nation's largest industry, employing 4.4 million persons directly and supporting another 10 to 12 million jobs in machinery, chemical, public utilities and other industries, and in processing and marketing food products.

Nonpoint agricultural pollutants are organic and inorganic materials entering surface and ground water from nonspecific sources in sufficient quantity to constitute a pollution problem. They include sediment, plant nutrients, pesticides, and animal wastes from cropland, rangeland, pastures and farm woodlots. Sediment is the major pollutant in terms of volume. A new study, "Methods and Practices for Controlling Water Pollution from Agricultural Nonpoint Sources," which was prepared for the U.S. Environmental Protection Agency by the Economic Research Service, U.S. Dept. of Agriculture, is available from the U.S. Government Printing Office, Washington, D.C. 20402 for $1.10.

Environmental improvement action must be geared to the local level and based on community needs, according to Roger W. Powers, president of Keep America Beautiful, Inc.

Mr. Powers scored the "gloom and doom" syndrone which has marked some recent public attitudes toward the environment, in which "the average citizen threw up his hands in despair and resigned his grandchildren to a treeless future, where water would be strictly rationed and gas masks the order of the day. This attitude is changing," he said, "and individuals are realizing that their actions and inactions have an environmental impact . . . and that the world their grandchildren will inherit will be just as environmentally sound as they are willing to work—perhaps sacrifice—to make it."

Keep America Beautiful, Inc., was founded in 1953 as a national, nonprofit public service organization working with individuals, government agencies, and private industry to stimulate individual involvement in improving the environment.

"It is the people who determine environmental policy and the means of carrying out that policy must be as responsive as possible to the public's desires. That is done by the Congress enacting and amending laws and overseeing their implementation. The credibility gaps and cynicism which are regrettably so rampant today make it all the more essential that environmental decisions not only be wise and well-founded, but that the public knows this to be true.

"One way to improve the public's opinion is through greater citizen participation in standard-setting and other regulatory procedures. The public should not only be allowed to participate in such matters, but they should be encouraged to do so —and we should bend over backwards to facilitate that participation."—Russell E. Train, *Administrator, U.S. Environmental Protection Agency. (Remarks before the National Conference of Standards for Environmental Improvement.)*

Energy development affects land use — "Major land use decisions will be required to properly site the hundreds of new energy facilities to be built in the next 25 years in this country. These include nuclear and coal fired powerplants, refineries, coal conversion plants, geothermal units, and a wide array of petroleum handling facilities both onshore and off. From a land consumption point of view, electric transmission line rights-of-way already cover an area larger than the State of Connecticut and, by the year 2000, an area the size of New Jersey will be added."—*Russell W. Peterson, Chairman, Council of Environmental Quality.*

Real estate buyers in northern New Hampshire may now refer to the new Real Estate Buyers' Checklist prepared by the North Country Resource Conservation and Development Project. Aim of the publication is to help promote good land use, encourage better housing developments, and increase the satisfaction and happiness of people moving to the area. The checklist, developed by a committee of real estate people, bankers, town officials, and technical specialists, includes a questionnaire on site development, information on subdivision regulations, community and private services, and a directory of where to go for further help.

The U.S. Forest Service recently inventoried the commercial forest lands in the 187-million acre National Forest System and found that 3.3 million acres currently need reforesting. In the main, these under-producing areas were affected by fires, windstorms, insects, and disease—or are lands acquired by the Forest Service in a logged-off or farmed-out condition.

Plants, Animals, and Man. Proceedings of the 28th Annual Meeting of the Soil Conservation Society of America (7515 Northeast Ankeny Road, Ankeny, Iowa 50021). *1974. 272 pp., illus. $5.*

This publication contains 56 papers by individuals in the fields of education and research. It covers such topics as the state's role in land use planning, the impact of air pollution on the forest resource, legislation regulating surface mining, changing concepts in outdoor recreation, fish and wildlife habitat improvement in watershed projects, and the role of the natural resource specialist in adult education.

Farming Terraced Land. Written by Paul Jacobson and Walter Weiss, 1952; revised by R. C. Barnes, Jr. *1973. USDA Leaflet No. 335. 16 pp., illus. $0.25.*

Explains and illustrates various methods of farming terraced land. Describes how to use both the one-way and the two-way plows on nonparallel and parallel terraces; how to use other tillage implements; methods of planting row crops on nonparallel and parallel terraces; and how to harvest close-sown crops, row crops, and hay.

For the fun of it . . . and then some! *1974. USDA-Soil Conservation Service. PA-1060. 11 pp., illus. $0.35.*

A colorful, informative booklet on the economic benefits and recreation, and community growth gained through small watershed projects and area response.

Community improvement through resource conservation and development. *1974. USDA-Soil Conservation Service. PA-1077. 16 pp., illus. $0.40.*

This booklet provides specific answers to the most commonly asked questions about the RC&D projects. The booklet tells what an RC&D project can, and can't do; how local people can organize a project and plan an RC&D program of action; and how the federal government, state agencies, and local individuals participate. Various measures undertaken by RC&D projects across the country are illustrated with colored photographs.

Environmental Conservation Education: A Selected Annotated Bibliography. Compiled for the Conservation Education Association. *1974. Interstate Printers & Publishers, Inc., Danville, Illinois 61832. 70 pp. $2.50.*

Subject categories of this comprehensive biblography include: Environmental Awareness, Ecology, Air, Animals, Energy, Minerals, Plants, Soil, Water, Conservation (General), Consumer Patterns, History of Resource Use, Planning and Managing Natural Resources, Population, Quality of the Environment, Social Implications of Conservation, Urban Environment, Environmental Education and Career Opportunities. This bibliography should be useful to teachers and other persons interested in or working with organizations or agencies concerned with conservation education.

Review

Water, A Primer. Luna B. Leopold. *1974. W. H. Freeman and Company, San Francisco, California. 172 pp., illus. $4.95 (cloth), $2.95 (paperback).*

This highly informative, well written book covers the general principles of hydrology and many facts concerning water use. It contains simple but technically sound information written in terms understandable to the nonspecialist. The principles and concepts which it explains, with one or two minor exceptions, are consistent with those accepted by the Soil Conservation Service (SCS).

The book is divided into two major parts: Hydrology and Water Supplies and Water Use.

The hydrology section discusses precipitation, surface water and ground water, surface runoff and storage, the drainage network, flow frequency and floods, the flood plain and the channel, the load of rivers, and soil, plants, and water. The discussion of the hydrologic cycle is simple and adequate. The author describes the relationships of infiltration, surface runoff, aquifers, and ground water, as well as the movement of water in saturated materials. Surface runoff and storage is discussed in considerable detail including the U.S. Geological Survey stream-gaging program and water supply papers. A streamflow hydrograph is described and the time-discharge rate relationships explained.

The discussion of drainage networks describes stream patterns and stream orders. An explanation of flow frequencies and floods helps readers to understand the probability of flood occurrences and explains the functions of flood plains and channels. Sediment and other water pollutants are described; and soil moisture relationships, erosion, and plant cover are discussed in the section on soil, plants, and water.

Part II, Water Supplies and Water Use, discusses water in the world, the water budget and the amount of water available, and its present use. The last chapter is the most interesting to people concerned with SCS programs. The use of water in homes and cities is discussed as well as city water systems, including water purification and distribution and sewage and waste treatment.

The discussions of irrigation and farm ponds vary somewhat from concepts generally accepted by SCS. The book seems to recommend heavy leaching and subsurface drainage to manage soluble salts while SCS leans more toward planned applications which replace needed soil moisture within the root zone.

The section on farm ponds emphasizes the loss of water by surface evaporation, the need for ponds to be designed to minimize these losses, and the loss of downstream flow volumes because of farm pond impoundments. SCS does not fully subscribe to this last concept. Firsthand observation and more detailed studies indicate that downstream losses due to farm ponds are negligible. In the semiarid and arid West where such losses would be important, observation shows that farm ponds most commonly are filled by localized thunderstorms, the runoff from which usually would be absorbed by streambeds before it goes into downstream reaches.

This runoff even without farm ponds would not be available to downstream users in most instances. This concept was verified by the studies of consulting engineers on the Brazos River in Texas.

The discussions of flood control are very good and the upstream—downstream concepts are fully consistent with those held by SCS.

Water, A Primer is a good book that will provide informative, worthwhile reading to anyone interested in learning more about this subject. **—Eugene C. Buie, *assistant deputy administrator—River Basins, SCS, Washington, D.C.***



Soil surveys

Indiana

Shelby County. By Shelby H. Brownfield. *1974. Soil Conservation Service in cooperation with Purdue University Agricultural Experiment Station. 92 pp., illus.; maps.*

Meetings

Minnesota

Hennepin County. By Robert A. Lueth. *1974. Soil Conservation Service in cooperation with Minnesota Agricultural Experiment Station. 159 pp., illus.; maps.*

Missouri

Caldwell County. By Allan H. Jeffrey. *1974. Soil Conservation Service in cooperation with Missouri Agricultural Experiment Station. 56 pp., illus.; maps.*

Nebraska

Polk County. By Vernon C. Seevers and Robert S. Pollock. *1974. Soil Conservation Service in cooperation with University of Nebraska Conservation and Survey Division. 80 pp., illus.; maps.*

Oregon

Yamhill Area. By George E. Otte, Duane K. Setness, Walter A. Anderson, Fred J. Herbert, Jr., and Clarence A. Knezevich. *1974. Soil Conservation Service in cooperation with Oregon Agricultural Experiment Station. 130 pp., illus.; maps.*

Utah

Salt Lake Area. By Lowell Woodward, John L. Harvey, Karl M. Donaldson, Jungi J. Shiozaki, Garth W. Leishman, and J. Howard Broderick. *1974. Soil Conservation Service in cooperation with Utah Agricultural Experiment Station. 132 pp., illus.; maps.*

August

11–14 *Conservation Education Association, Syracuse, N.Y.*
11–14 *National Farm and Power Equipment Dealers Association, Minneapolis, Minn.*
11–14 *Soil Conservation Society of America, Syracuse, N.Y.*
12–14 *Conference on Great Lakes Research, Ontario, Canada*
12–20 *Tenth International Congress of Soil Science, Moscow, U.S.S.R.*
14–16 *American Society of Civil Engineers, Irrigation and Drainage Conference, Biloxi, Miss.*
18–21 *American Institute of Chemical Engineers, Salt Lake City, Utah*
18–21 *American Agricultural Economics Association, College Station, Tex.*

September

4–6 *American Water Works Association Chesapeake Section, Ocean City, Md.*
8–11 *American Fisheries Society, Honolulu, Hawaii*
9–13 *Seventh Congress—International Association for Research Into Water Pollution, Paris, France*
10–14 *Third International Man, Air, Water, Noise, and Waste Exhibition, "Environmental Expo," Paris, France*
11–13 *International Association of Game, Fish and Conservation Commissioners, Honolulu, Hawaii*
22–26 *National Association of State Departments of Agriculture, Milwaukee, Wis.*
22–27 *SCS State Conservationists Annual Meeting, Lexington, Ky.*
22–27 *Association of Conservation Engineers, Rapid City, S. Dak.*
29–Oct. 2 *American Forestry Association, Mackinac Island, Mich.*

October

5–8 *National Environmental Sanitation & Maintenance Education Conference, Chicago, Ill.*
6–11 *Water Pollution Control Federation, Denver, Colo.*
9–13 *American Horticultural Society, Arlington, Va.*
10–11 *American Forest Institute, Minneapolis, Minn.*
11–14 *National Association of Biology Teachers, Inc., New York, N.Y.*
12–15 *Farm and Industrial Equipment Institute, Orlando, Fla.*
14–17 *American Society for Testing and Materials, Detroit, Mich.*
15–18 *Future Farmers of America, Kansas City, Mo.*
15–18 *National Conference of Editorial Writers, Louisville, Ky.*
15–18 *National Recreation Research Applications Workshop, Copper Mountain, Colo.*
20–24 *National Association of County Agricultural Agents, Tucson, Ariz.*
20–25 *National Congress for Recreation and Parks, Denver, Colo.*
21–25 *Association of Engineering Geologists, Denver, Colo.*
21–25 *American Society of Civil Engineers, Kansas City, Mo.*
23–26 *National Council for Geographic Education, Chicago, Ill.*
27–30 *Sprinkler Irrigation Association, Lake Buena Vista, Fla.*
28–30 *American Plywood Association, Houston, Tex.*
31–Nov. 1 *American Association For Vocational Instructional Materials, Atlanta, Ga.*

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D. C. 20401

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300
AGR 101

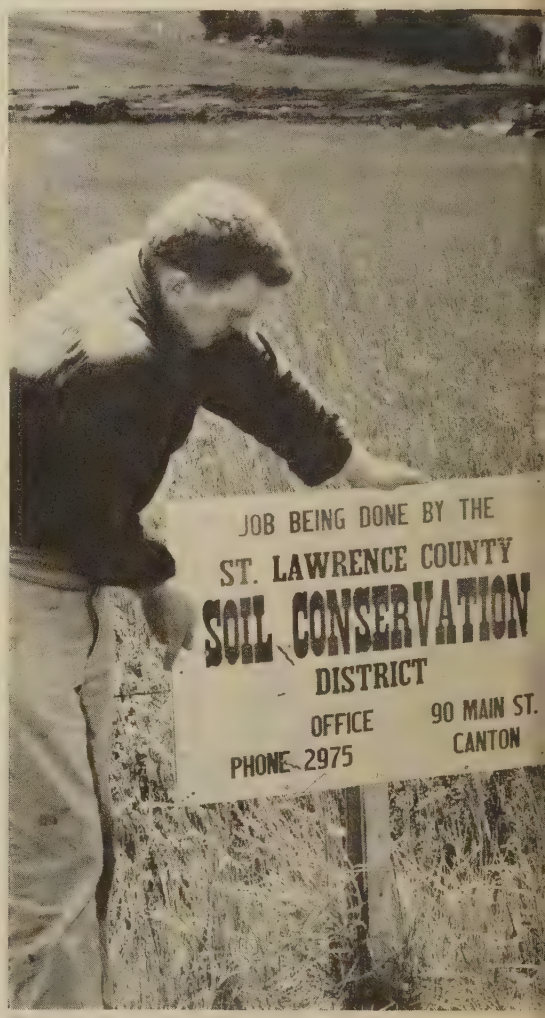
U.S.MAIL

POSTAGE AND FEES PAID
U. S. GOVERNMENT PRINTING OFFICE

MOVING? Send present mailing label and new address, including zip code, to Division of Public Documents, U.S. Government Printing Office, Washington, D.C. 20401.







High, low, and in between—SCS and soil conservation district people are hard at work. Here, a snow surveyor packs into Arizona's Baldy Wilderness Area; an SCS technician checks depth of a Connecticut irrigation reservoir; and a man and a sign advertise a Pennsylvania district's part in building a pond.

SOIL conservation

U.S. DEPT. OF AGRICULTURE
NATL. AGRIC. LIBRARY
SEP 22
CURRENT SERIAL RECORDS

INDEX

Issued June 1975

August 1973 to July 1974

Volume 39

SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE

For sale by the Supt. of Doc. U.S. Government Printing Office, Washington, D.C. 20402
Subscription price $6.85 per year, $8.60 foreign mailing. Index issues vary in price.

SOIL CONSERVATION—INDEX TO VOLUME 39

United States Department of Agriculture, Soil Conservation Service

August 1973 to July 1974

Abbott, E. L.: *No odor and no pollution.* Sept—8
ACT(S)—
Agriculture and Consumer Protection. May—21
Coastal Zone Management. May—21
Environmental Protection. July—16
Fish and Wildlife Restoration Funds. May—21
Flood Disaster Protection. May—21
Land and Water Conservation Fund. May—21
Land Use Policy and Planning Assistance. May—21
Rural Development. May—21
Small Wetlands Acquisition. May—21
Water Bank. May—21
Water Resources Development. May—21
AGREEMENT—
Great Lakes Water Quality Agreement. July—18
Agriculture Research Service—
snow-melt runoff forecasts (Idaho). Jan—7
Agricultural Stabilization and Conservation Service—
cost-sharing pollution problem solving with Texas college. Apr—17
funds for wildlife project (Wash.). Mar—18
helps with walnut planting (Ark.). Oct—8
rural development in Louisiana. Dec—10
Agricultural waste management onsite SCS assistance. Feb—9
Airport designed to fit environment (Tex.). Sept—12
ALABAMA—
flood protection and opportunities for community growth and improvement. Dec—4
Allen, Dale D.: *Patterns for wildlife.* Mar—12
Alt, Rodney: *Colorado's high speed test center.* June—16
Altering Alabama's history. W. B. Lingle. Dec—4
Alverson, Kent: *Cattle and catfish on surface-mined land.* Nov—4
American Mainland. Apr—13
Anderson, Tom: New Mexico plants a great idea. July—8
ARIZONA—
soils tour for urban and environmental planners. Dec—15
ARKANSAS—
thinks young. Jack Gibson. May—15
trees no crowd. Max D. Bolar. Oct—8

Bainbridge, Richard S.: *Thinking thin.* Oct—10
Barber, Dick—
Pear trees, orchardgrass, and Angus cattle. Feb—20
Producing cattle on grass. July—13
Baumann, Edgar F.: *Willing to learn and willing to do.* Dec.—20
Berkland, Mark: *More water, less work for Iowa farmer.* May—14
Berry, Neal C.: *A timely takeoff with RC&D.* Jan—18
Betts, Lynn: *Conservation goes to college.* Apr—11
Bohart, John V.: *Flood Plains.* June—19
Bolar, Max D.: *Arkansas: trees no crowd.* Oct—8
Bosworth, Duane A.: *Conservation in action at Boy Scout Jamboree.* With Byron A. Breisch, Jr. Nov—11
BOY SCOUTS Jamboree (Idaho and Pa.). Nov—11
Braley, Norris D.: *Soil protection for spud production.* With Duane A. Smith. June—14
Breisch, Byron A., Jr.: *Conservation in action at Boy Scout Jamboree.* With Duane A. Bosworth. Nov—11
Britt, Paul R.: *No-Till Stands Tall.* Apr—21
Brush control (Wyo.). Oct—20
Budd, Dan S.: *The sweep of sage or a sea of grass.* Oct—20
Buie, Eugene C., Review of *Water, A Primer.* July—22
Building a data base. Elmer F. Sauer. July—19
Bull's eye for reclamation. George McGrath. May—11
Bureau of Outdoor Recreation—
compiled recreation inventory. Apr—20
Busek, Ernie: *Welcome Wagon for wildlife.* Mar—18
Butz, Earl L.—
Full Production with Conservation. Apr—4
Statement on land-use policy. Dec—21

CALIFORNIA—
creek erosion. June—20
Lake Ponderosa wildlife preserve. Mar—19
Callahan, James E.: *Conservation campus.* Sept—22
Casey, William H.: *A fish story...* Mar—14
Catfish farming operation (Ill.). Nov—4
CATTLE—
and catfish on surface-mined land. Kent Alverson. Nov—4
water tanks help increase cattle gains (Colo.). Nov-15
windbreaks protects against winter storms (Nebr.). Apr—18
Center of rural excellence. Gene Warren. Dec—10
Changing the face of school sites. Jerry Schwien. Aug—10
Channel improves neighborhood (Tex.). Dec—14
Clark, Dr. Wilson F.: *Environmental education: home-brew style.* Aug—14
Clean-up of a lake. Richard L. Thompson. June—18
Coal then, corn now. Robert E. Craft. Sept—4
COLORADO—
environmental study areas in Pueblo school. Aug—10
finds new uses for range site surveys. E. F. Sedgley. May—16
high speed test center. Rodney Alt. June—16
space for wildlife and the elk. Apr—16
Water on every pasture. Jerry D. Schwien. Nov—15
Community approach to outdoor classrooms. Claude Crowley. Aug—20
Community fights erosion. Gene Warren. July—14
CONSERVATION—
—*a plan for all seasons.* Compiled by Kay Mergen. Aug—6
campus. James E. Callahan. Sept—22
education—it lasts a lifetime. Neal Munch. Aug—4
goes to college. Lynn Betts. Apr—11
in action at Boy Scout Jamboree. Duane A. Bosworth and Byron A. Breisch, Jr. Nov—11
methods to control water runoff. May—5

practices successful on Kansas cropland. Oct—18
practices used on outdoor learning center (Iowa). Apr—11
tillage jumps in Iowa. Wilson T. Moon. Nov—7
Cooperative Extension Service—
rural development in Louisiana. Dec—10
Coray, Max S.: *Mystery of the Falling Cliffs.* July—9
Corps of Engineers—
studies of flood hazards. May—4
Cox, Dr. Lloyd M.: *Research plus action.* With Sharon L. Norris. Jan—7
Craft, Robert E.: *Coal then, corn now.* Sept—4
Croom, Dan F.: *Last of a vanishing breed.* Jan—8
CROP(S)—
corn, soybeans, cotton by no-till method (N.C.). Apr—21
double cropping (Ind.). Feb—14
Produce More Protect More. Apr—13
production increased (Iowa). Nov—7
rotation—for spud production. June—14
suitable to certain land. Apr—2
walnut multicropping (Ark.). Oct—8
Cross, John M.—
Terraces no problem. Dec—8
Windbreaks for beefsteaks. Apr—18
Women at work—Outdoors. June—9
Crowley, Claude: *A community approach to outdoor classrooms.* Aug—20
Cummins, Eph I.: *"...not a hatful of grass."* Apr—10

DAM(S)—
beaver built. May—8
built in N.Y. to check floodwater. Jan—11
Hams Fork River Dam lake and water storage. June—18
Davey, William B.: *Working with nature in flood plains.* May—4
Design for quality. Kenneth E. Grant. June—2
Diagnosing the Great Lakes. Gerald B. Welsh. July—18
Dickerson, John A.: *Woody plants for Maryland highways.* With H. W. Everett and J. H. Kimmons. Feb—18
Dillon, Olan W.: *Looking out for fish in watershed projects.* May—6
DISTRICT(S)—
Allegan Soil Conservation District helps canners locate waste disposal site (Mich.). Sept—15
Benewah Soil and Water Conservation District cooperators work to improve big game habitat (Idaho). March—8
Brevard Soil and Water Conservation District cooperates in effort to protect (Fla.) Dusky. Mar—11
Coahoma County Soil and Water Conservation District working for drainage system (Miss.). Oct—16
Coke County Soil and Water Conservation District (Tex.). Apr-10
Eastern Panhandle Soil Conservation District helps select four new school sites (W.Va.). Sept—20
Excerpts from Secretary Butz speech before NACD Convention. Apr—4
Feliciana Soil and Water Conservation District assists tree farmer (La.). Jan-21
Lincoln County Conservation District land use planning assistance. June—18
Lower Elkhorn Natural Resources District help plan windbreaks (Nebr.). Apr—19
Monongahela Soil Conservation District gives assistance to power company in revegetating and stabilizing disturbed land (W. Va.). Dec—7
Moore Soil and Water Conservation District promoting no-tillage (N.C.). Apr—21
Poteau River Conservation District (Ark.) sponsors woodland management contest for youth. May—15
Rich Mountain Conservation District sponsors youth pasture management contest (Ark.). May—15
SCS assistance during FY 1973. Feb—4
Windham County Natural Resources Conservation District responds to pressures for soils data (Vt.) Jan—4
Dobson, Benny.: *Tree farming is good business.* Jan—20
Don't forget esthetic values. Philip R. Weatherman. Jan—22
Drainage problems in Bayou Area (Miss.). Oct—16
Drying up that Mississippi mud. Pam McPhail. Oct—16
Dune is reborn. Vincent J. Price. June—4
Duskies by the sea. Winston D. Tooke. Mar—10

ERTS (Earth Resources Technology Satellite) mosaic system. Dec—12
Economic Development Administration—
provides flood protection and water supply grant (Ohio). Dec—19
ECONOMIC(S)—
doomed industry has turnabout (N.J.). Apr-14
flood damage to chicken processing plant (Miss.). May—9
Lake Viva Naughton (Wyo.) recreation developments. June—18
Ecosystem preservation. Apr—8
EDUCATION—
--a lifetime job. Kenneth E. Grant. Feb—2
citizens groups work for environmental education goals for public schools (Tex.). Aug—20
community involvement develops school sites (Colo.). Aug—10
Conservation campus (Mo.). Sept—22
conservation project Martin High School (La.). July—14
environmental education supported by local funds (Mont.). Aug—14
Freehold (N.J.) outdoor classroom. Aug—4
Indian traditions revived in outdoor classrooms (Miss.). Aug—12
informal outdoor environment replaces formal classrooms (Ind.). Aug—18
Meeting the needs of educators. Aug—12
Natural classroom (Ill.). Sept—17
North Iowa Area Community College outdoor learning center. Apr—11
outdoor classroom experiences. Aug—6
outdoor classrooms for art, music, math, science and social studies and eager student participation (Tenn.). Aug—17
outdoor classrooms (Ark.) to be established in 76 conservation districts. May—15
outdoor learning areas part of youth board agenda (Oreg.). Dec—20

Recommendations for Teacher Certification in Environmental Conservation. Aug—9
Selecting suitable sites for schools (W.Va.). Sept—20
"that cannot wait". Dr. Clyde W. Hibbs. Aug—8

Edwards, Phil: *The Mussels of Markell Canal.* Mar—16
Elsewhere... Apr—21
Endangered species thrives in northern Michigan. Glenn E. Lamberg. Mar—6
ENVIRONMENT—
Natural Areas Policy and Procedure (SCS). Apr—9
Environmental education: homebrew style. Dr. Wilson F. Clark. Aug—14
Environmental forestry. Nov—8
Environmental Geomorphology and Landscape Conservation. Vol. 1: Prior to 1900. Edited by Donald R. Coates, reviewed by Donald E. McCormack. Dec—23
EROSION—
control measures in watershed plan (N.Y.). Jan—11
control methods on ski area (N.H.). Jan—16
falling cliffs at Paukaa, Hawaii. July—9
gullied land restoration on Texas ranch. Apr—10
of streambanks (N.Y.) endangered trout streams. Jan—13
sand dunes (Me.). June—4
Santa Rosa Creek (Calif.) bank erosion. June—20
threatened airport facility (Ohio). Jan—18
Turkey Creek (Mo.) banks turned into wildlife management area. Sept—22
Estepp, Ron: *Selecting suitable sites for schools.* Sept—20
Everett, H. W.: *Woody plants for Maryland highways.* With John A. Dickerson and J. H. Kimmons. Feb—18
Experiences unlimited. Joe E. Wright. Aug—18
Extension Service—
helps with walnut planting (Ark.). Oct—8

Fager, Leon: *Wildlife bonanza.* With Barry Wallace. Mar—19
Family sticks to the land. Gene Warren. Apr—6
Farmers Home Administration—
helps with walnut planting (Ark.). Oct—8
long-term loan for flood protection project (Ohio). Dec—19
rural development in Louisiana. Dec—10
Federal Railroad Administration—
evaluates high speed test center future development. June—16
FEEDLOT(S)—
runoff under control. Willie Y. Reece. Apr—17
protected by windbreaks (Nebr.) Apr—18
waste management system (Nebr.). Sept—10
with no odor and no pollution (Tex.). Sept—8
Fish story... William H. Casey. Mar—14
Fishermen's find. James R. Shelton. May—20
Flagstone industry thrives again. Jerome C. Hytry. Apr—14
Fleming, Rose—
Outdoor classroom helps revive Indian traditions. Aug—12
When Old Man River Raged. May—8
Flood Plains. Charles V. Bohart. June—19
FLOOD(S)—
control terraces (N. Mex.). Dec—16
losses can be minimal. June—19
Mississippi damages of 1973. May—8
plains state and local legislation. May—21
Working with nature in flood plains. May—4
FLORIDA—
Keeping a Florida subdivision low and dry. June—6
protects rare and endangered Dusky seaside sparrow. Mar—10
Forest Service—
active in reforestation work on Perins Peak Wildlife Management Area (Colo.). Apr—16
browse rehabilitation study (Idaho). Mar—8
helps with walnut planting (Ark.). Oct—8
provides warbler habitat on state and federal lands (Mich.). Mar—6
researches for blight resistant chestnut tree. Oct—13
From gully to grass. Dennis D. Roscoe. Nov—19
Full Production with Conservation. Excerpts from the speech by Secretary of Agriculture Earl L. Butz at the 1974 Annual Convention of the NACD. Apr—4

GEORGIA—
no-till method yields 204.6 bushels of corn. Apr—21
Get a grip on your grass. Paul F. L. Haroldson. Nov—18
giant fits into the Texas environment. Norwood McLendon. Sept—12
Gibson, Jack: *Arkansas thinks young.* May—15
Grant, Kenneth E.—
Design for quality. June—2
Education—a lifetime job. Feb—2
Land-use planning. Dec—2
Meeting the needs of educators. Aug—2
New plan for water resources. May—2
New year, new challenges. Jan—2
Preserving prime farmland. Apr—2
Produce and protect. Nov—2
Recycling a resource. Sept—2
Shadow cast by trees. Oct—2
Where it's at. July—2
Wetlands and wildlife and weather. Mar—2
GRASS(ES)—
American beachgrass to stabilize dunes in Maine. June—6
coastal bermudagrass most tolerant on feedlot fertilizer-irrigation project (Tex.). Sept—8
cordgrass habitat of rare and endangered species (Fla.). Mar—10
dwarf pangolagrass used on eroded cliffs. July—9
From gully to grass (N. Dak.). Nov—19
Get a grip on your grass (N. Dak.). Nov—18
Growing grass on rock. July—10
is right on rights-of-way. O. L. Helmick. Dec—7
land improvement work in patterns for improved wildlife habitat and livestock production (Tex.). Mar—12
Planned grazing in the beef state. May—18
Producing cattle on grass. July—13
sideoats grama, KR bluestem, sand lovegrass, green sprangletop, switchgrass, and indiangrass planted on gullied rangeland (Tex.). Apr—10
stops erosion problem at Louisiana high school. July—15
testing native prairie grasses in Iowa. July—5
The sweep of sage or a sea of grass (Wyo.). Oct—20
Tufcote bermudagrass. July—15

used on scarred quarry area. July—10
wheatgrass, bromegrass, alfalfa, and other plants seeded on Colorado wildlife area. Apr—16
Great Lakes Water Quality Agreement (1972). July—18
GPCP—
cost-shared terrace construction (Nebr.). Dec—8
cost-shares fencing, pipelines, stock tanks on (Colo.) ranch. Nov—15
cost sharing guarantees completion of conservation program (Kans.). Oct—18
shows him the "big picture." James-Habiger. Nov—21
SCS activities FY-1973. Feb—9
works for young and old. Louis H. Lash. Nov—18
Green future for prairie grasses? John Maddy. July—4
Growing grass on rocks. Leroy E. Werchan. July—10
Growing more of everything. David S. Mackey. July—15

Habiger, James: *GPCP shows him the "big picture."* Nov—21
Hamilton, Roy E.: *One plus one—double cropping grows in the Corn Belt.* Feb—14
Hanes, John W.: *A new look for Santa Rosa Creek.* June—20
Haroldson, Paul F. L.: *Get a grip on your grass.* Nov—18
Harryman, Robert L.: *They're taming a panther.* With Dale Mitchell. May—10
Hartman, Herbert: *Maine's way of maintaining her natural areas.* With Robert Wengrzynek. Feb—16
HAWAII—
eroded cliffs reshaped and seeded. July—9
Helmick, O. L.: *Grass is right on rights-of-way.* Dec—7
Help thy neighbor. Christine Johnson. Oct—7
Herd, Jim (Mo.) made soil and water conservation work. July—15
Hibbs, Dr. Clyde W.: *"Education that cannot wait."* Aug—8
Hortin, J. Kent: *Park planning is no picnic!* With Ivan L. Lines. July—11
Humke, John: *Why Natural Areas are important.* Apr—8

Hytry, Jerome C.: *Flagstone industry thrives again.* Apr—14

IDAHO—
Boy Scout Jamboree. Nov—11
Fishermen's find. May—20
improves game range. Mar—8
measures and forecasts water supplies. Jan—7
ILLINOIS—
outdoor classroom responsive to community. Sept—17
reclaiming of surface-mined land. Nov—4
strip-mine reclamation in Fulton County. Sept—4
Improved channel improves a neighborhood. Terry E. Smith. Dec—14
In a Year's Time. Summary of activities of the Soil Conservation Service. Feb—4
INDIANA—
cemetery adopts conservation practices. Jan—22
double-cropping in the Corn Belt. Feb—15
student experiences in a natural environment. Aug—18
In search of the American Chestnut. Vincent J. Price. Oct—12
IOWA—
Conservation goes to college. Apr—11
conservation tillage. Nov—7
Green future for prairie grasses? July—4
More water, less work for Iowa farmer. May—14
IRRIGATION—
center pivot system (Nebr.). Dec—8
Irrigation. June—11
reservoirs on ranch (Colo.). Nov—17
sprinkler system spread liquid waste (Tex.). Apr—17
sprinkler system supports plant growth (Calif.). June—20
Ischua Creek Watershed Protection and Flood Prevention Project (N.Y.). Jan—10

Jackson, Leland G.: *Keeping the feeder in business.* Sept—10
Jeter, Frank, Jr.: *Sanitary landfills on the rise.* Dec—19
Johnson, Christine: *Help thy neighbor.* Oct—7

KANSAS—
GPCP shows the "big picture". Nov—21
Planned grazing systems work in "bluestem country". Nov—20
Keeping a Florida subdivision low and dry. James N. Krider. June—6
Keeping the feeder in business. Leland G. Jackson. Sept—10
Kidman, Bruce: *Terraces for flood control.* Dec—16
Kimmons, J. H.: *Woody plants for Maryland highways.* With H. W. Everett and John A. Dickerson. Feb—18
Koerner, Robert O.: *Wildlife in your yard: to enjoy and photograph.* Mar—20
Krider, James N.: *Keeping a Florida subdivision low and dry.* June—6

Lamberg, Glenn E.: *An endangered species thrives in northern Michigan.* Mar—6
LAND USE—
area-wide conservation plan (Wyo.). June—18
assistance and information furnished high speed test center (Colo.). June—16
Building a data base (N.J.). July—19
data base built for Passaic Township (N.J.). July—19
decisions in the Great Lakes Basin to be provided by U.S. and Canada study. July—18
developing school grounds to function as recreational and environmental education area. July—11
flood plains for parks, recreation areas. June—19
Full Production with Conservation. Apr—4
lake for recreation and wildlife (Calif.). Mar—19
Lake Land College (Ill.) outdoor classroom. Sept—17
multiple use for trees, livestock, and wildlife (Iowa). Oct—10
planning. K. E. Grant. Dec—2
range site descriptions, resource tool. May—17
recreation "play-for-pay" archery golf course on farm (Ohio). July—12
Statement on land-use policy. Dec—21
strip-mine reclamation land (Ill.). Sept—4
surface-mined land for catfish farming, cattle, recreation, and wildlife (Ill.). Nov—6
Where it's at. July—2
Windbreaks for beefsteaks (Nebr.). Apr—18

Lash, Louis H.: *GPCP works for young and old.* Nov—18
Last of a vanishing breed. Dan F. Croom. Jan—8
Leopold, Luna B.: *Water, A Primer.* July—22
Lines, Ivan L., Jr.: *Park planning is no picnic!* With J. Kent Hortin. July—11
Lingle, W. B.: *Altering Alabam 's history.* Dec—4
LIVESTOCK—
feed more cattle on same amount of land. May—18
feeder-pig project new source of income (La.). Dec—10
production through brush control (Tex.). Mar—12
Living space for Colorado's elk. Bob Saile. Apr—16
Look at the United States—from space. Vincent J. Price. Dec—12
Looking out for fish in watershed project. Olan W. Dillon. May—6
LOUISIANA—
Brownfield Elementary School outdoor classroom. Aug—7
Family sticks to the land. Apr—6
"green-up" project on school campus fights erosion. July—14
Park Special Education School outdoor classroom. Aug—7
tree farming. Jan—20
Lubbock Christian College solves own pollution problem (Tex.). Apr—17

Mackey, David S.: *Growing more of everything.* July—15
Maddy, John: *A green future for prairie grasses?* July—4
MAINE—
Aroostook County, a top potato growing area. June—14
Dune is reborn. June—4
way of maintaining her natural areas. Robert Wengrzynek and Herbert Hartman. Feb—16
MARYLAND—
highways seeded areas. Feb—18
Mason, Lamar R.: *Studying soil-plant relationships in Zion.* With Vear L. Mortensen. June—8
McCormack, Donald E., review of *Environmental Geomorphology and Landscape Conservation. Vol. 1: Prior to 1900.* Dec—23
McGrath, George: *A bull's-eye for reclamation.* May—11
McLendon, Norwood: *A giant fits into the Texas environment.* Sept—12
McPhail, Pam: *Drying up that Mississippi mud.* Oct—16
Meeting the needs of educators. Kenneth E. Grant. Aug—2
Mergen, Kay: *Conservation—a plan for all seasons.* Aug—6
MICHIGAN—
fruit canners solve waste water problem. Sept—15
protects nesting colony of endangered Kirtland warbler. Mar—6
Minick, Homer (Iowa) solves water problem. May—14
MINING—
flagstone industry revived in Pennsylvania. Apr—14
scarred landscape and uncontrolled erosion transformed into pistol range (W. Va.). May—11
Minnich, Charles (Ohio) owns and operates archery golf course. July—12
MISSISSIPPI—
drainage problem in Bayou area. Oct—16
outdoor classrooms on Choctaw tribal lands. Aug—12
When Old Man River Raged. May—8
MISSOURI—
campus turned into environmental learning area. Sept—22
Jim Herd follows conservation advice and land pays off. July—15
Panther Creek Watershed Project tames creek. May—10
Mitchell, Dale: *They're taming a panther.* With Robert L. Harryman. May—10
MONTANA—
Environmental education: homebrew style. Aug—14
"help thy neighbor" spirit. Oct—7
Moon, Wilson T.: *Conservation tillage jumps in Iowa.* Nov—7
More water, less work for Iowa farmer. Mark Berkland. May—14
Mortensen, Vear L.: *Studying soil-plant relationships in Zion.* With Lamar R. Mason. June—8
Munch, Neal: *Conservation education—it lasts a lifetime.* Aug—4
Mussels of Markell Canal. Phil Edwards. Mar—16
Mystery of the Falling Cliffs. Max C. Coray. July—9

NACD Recreation Inventory. Charles G. Phillips. Apr—20
Natural areas identified, classified, and described (Me.). Feb—16
Natural classroom. Vincent J. Price. Sept—17
Nature Conservancy. Apr—8
NEBRASKA—
Holmes Park flood plains. June—19
leaders increasing beef production. May—18
shelterbelts protect golden eagles. Mar—17
Terraces no problem. Dec—8
waste management for feedlots. Sept—10
Windbreaks for beefsteaks. Apr—19
NEW HAMPSHIRE—
ski development area uses conservation practices. Jan—16
New Hope for New Lexington. George L. Schmelzer. Dec—18
NEW JERSEY—
Building a data base. July—19
flagstone industry revived. Apr—14
New look for Santa Rosa Creek. John W. Hanes. June—20
NEW MEXICO—
GPCP works for young and old. Nov—18
Pear trees, orchardgrass, and Angus cattle. Feb—20
plants a great idea. Tom Anderson. July—8
rancher and conservationist Ed Salyer switched from wheat to grass and clover. July—13
school for handicapped operates native plants nursery. July—8
New plan for water resources. Kenneth E. Grant. May—2
New Pocket Guide. May-20
New year, new challenges. Kenneth E. Grant. Jan—2
NEW YORK—
Ischua Creek watershed economic uplift. Jan—10
pool diggers carve out cool pool for trout. Jan—15
No odor and no pollution. E. L. Abbott. Sept—8
NORTH CAROLINA—
Central Junior High School outdoor biology laboratory. Aug—7

farming and wildlife coexist on Markell Canal. Mar—16
No-till Stands Tall. Apr—21
sanitary landfills. Dec—19
NORTH DAKOTA—
From gully to grass. Nov—19
Get a grip on your grass. Nov—18
No scars on the landscape. Calvin J. Perkins. Jan—16
No-till Hundred Bushel Corn Club (N.C.) Apr—21
No-till Stands Tall. Paul R. Britt. Apr—21
Norris, Sharon L.: *Research plus action.* With Dr. Lloyd M. Cox. Jan—7
"...not a hatful of grass." Eph I. Cummins. Apr—10

OHIO—
archery golf course. July—12
Monroe County Airport sedimentation and erosion problems. Jan—18
OKLAHOMA—
independent producer reclaims spoil banks. Jan—8
One plus one—double cropping grows in the Corn Belt. Roy E. Hamilton. Feb—14
Our engineers versus their engineers. May—8
Outdoor classroom helps revive Indian traditions. Rose Fleming. Aug—12

Park planning is no picnic! J. Kent Hortin and Ivan L. Lines, Jr. July—11
Parrish, Thomas R.: *Prescribed burning improves big game range.* Mar—8
Patterns for wildlife. Dale D. Allen. Mar—12
Patterson, Helen: *Through an open door.* Aug—16
Pear trees, orchardgrass, and Angus cattle. Dick Barber. Feb—20
PENNSYLVANIA—
Bluestone Association self-help committee. Apr—15
Boy Scout Jamboree. Nov—11
reversing trend for rare and endangered species. Mar—5
Perkins, Calvin J.: *No scars on the landscape.* Jan—16
Phillips, Charles G.: *NACD Recreation Inventory.* Apr—20
Piowar, Thaddeus S.: *Recycling waste water.* Sept—15
Planned grazing in the beef state. Vincent Price. May—18
Planned grazing systems work in "bluestem country." Glenn P. Snell. Nov—20
PLANTS(S)—
native New Mexico plants to help handicapped. July—9
tropical plants (V.I.). June—20
PLANT MATERIALS—
Center finding economical methods for seeding highways (Md.). Feb—18
solving conservation and environmental problems. Feb—9
POLLUTION—
abatement system developed for feedlot runoff (Tex.). Apr—17
Diagnosing the Great Lakes. July—18
people problem to ranchers. June—18
POND(S)—
and terraces included in pollution control system (Tex.). April—17
Ponds are for... May—12
system (Iowa) solves water hauling chore. May—14
included in conservation plan (Iowa). Apr—11
Postle, Gordon C.: *Taking a shot at archery golf.* July—12
Prefabs for Phoebes and Barn Swallows. Gene A. Whitaker. July—6
Prescribed burning improves big game range. Thomas R. Parrish. Mar—8
Preserving prime farmland. Kenneth E. Grant. Apr—2
Price, Vincent J.—
A dune is reborn. June—4
A look at the United States—from space. Dec—12
A natural classroom. Sept—17
In search of the American chestnut. Oct—12
Planned grazing in the beef state. May—18
Soil interpretations for environmental forestry. Nov—8
Troops, trout, and Trout Unlimited. Jan—12
Produce and protect. Kenneth E. Grant. Nov—2
PRODUCE MORE, PROTECT MORE...a challenge to the American farmer. (The American Mainland). Apr—12
Producing cattle on grass. Dick Barber. July—13
Protection of rare and endangered species. Gerald W. Root. Mar—4
Prout, Carrow T.: *A tree farm revisited.* Oct—4

RANGE—
ecosystems (Colo.). May—16
reclamation (Tex.). Apr—10
RECREATION—
camping and fishing facilities. June—18
develops school grounds for recreation and environmental education areas (Utah). July—11
fishing at Idaho's Montpelier Creek Reservoir. May—20
fishing, camping, boating, and hiking on strip-mine reclamation land (Ill.). Sept—7
hunting fees help pay for wildlife management tract (Colo.). Apr—16
lake built, stocked, and seeded (Calif.). Mar—19
multipurpose lakes and dams (Ala.) Dec—5
NACD Recreation Inventory. Apr—20
Park planning is no picnic! July—11
Ridgeway Lyons Club (Mo.) develop public recreation area. May—11
Steelhead trout spawning grounds. June—20
Taking a shot at archery golf. July—12
W. Va. Wadcutters Gun Club. May—11
Recycling a resource. Kenneth E. Grant. Sept—2
Recycling waste water. Thaddeus S. Piwowar. Sept—15
Reece, Willie Y.: *Feedlot runoff under control.* Apr—17
Report from the Virgin Islands. William G. Saalman and Carol F. Smith. July—16
Research plus action. Sharon L. Norris and Dr. Lloyd M. Cox. Jan—7
RC&D—
Bitter Root project (Mont.). Oct—7
Buckeye Hills project (Ohio). Jan—18
Chariton Valley project (Iowa). July—5
Endless Mountains project (N.J.). Apr—14
North County project (N.H.). Jan—16
Northeast Project (Miss.). May—9
Northwest project (Miss.). Oct—16
SCS projects and assistance. Feb—7

Southwest project (Mo.). Sept—23
Southwest New Mexico RC&D Council. July—8
Threshold to Maine project. June—4
Western Wyoming project. June—18
Resource technology development. Feb—9
River basin planning—SCS activities. Feb—6
Root, Gerald W.: *Protection of rare and endangered species.* Mar—4
Roscoe, Dennis D.: *From gully to grass.* Nov—19
Roth, Bernhard A.: *Soil survey "infantry" goes airborne.* Jan—4
Rural Development Committee (La.) receives USDA Distinguished Service Award. Dec—10

Saalman, William G.: *Report from the Virgin Islands.* With Carol F. Smith. July—16
Saile, Bob: *Living space for Colorado's elk.* Apr—16
Salyer, Ed (N. Mex.) plants land to grass for producing more cattle. July—13
Sanitary landfills on the rise. Frank Jeter, Jr. Dec—19
Sauer, Elmer F.: *Building a data base.* July—19
Schmelzer, George L.: *New Hope for New Lexington.* Dec—18
Schwien, Jerry—
Changing the face of school sites. Aug—10
Water on every pasture. Nov—15
Sedgley, E. F.: *Colorado finds new uses for range site surveys.* May—16
Selecting suitable sites for schools. Ron Estepp. Sept—20
Sewage disposal problems (Vt.). Feb—20
Shadow cast by trees. Kenneth E. Grant. Oct—2
Shelter for golden eagles. Wilfred J. Stuart. Mar—17
Shelton, James R.: *Fishermen's find.* May—20
Small Business Administration—
grants loan for bark-for-bedding industry (Mont.). Oct—17
Smith, Carol F.: *Report from the Virgin Islands.* With William G. Saalman. July—16
Smith, Duane A.: *Soil protection for spud production.* With Norris D. Braley. June—14
Smith, Gordon S.—
Tropical plants booklet goes worldwide. June—20
Watershed protection project makes it—a living creek. Jan—10
Smith, Terry E.: *Improved channel improves a neighborhood.* Dec—14
Snell, Glenn P.: *Planned grazing systems work in "bluestem country."* Nov—20
SOIL(S)—
data and sewage disposal. Barry Stryker and William T. Steele. Feb—20
interpretations for environmental forestry. Vincent J. Price. Nov—8
protection for spud production. Norris D. Braley and Duane A. Smith. June—14
surveys alerts park planners in Utah. July—11
survey data helped with planning and inventory (N.J.). July—19
survey "infantry" goes airborne. Bernhard A. Roth. Jan—4
surveys used to locate bluestone deposits (N.J.). Apr—15
tour. Christopher Williams. Dec—15
SOIL CONSERVATION SERVICE—
assisted mausoleum expansion project (Ind.). Jan—22
assists in developing mined area into pistol range (W. Va.). May—11
assists in park planning (Utah). July—11
assists Iowa farmer with terrace and pond system. May—14
assists landowners plan for windbreaks (Nebr.). Apr—19
assists with protection and management of wetlands and wildlife habitats (Pa.). Mar—4
barnstorms for crop rotation in Maine. June—14
biologist designs prefabs for phoebes and barn swallows. July—6
brush control-grassland improvement programs (Tex.). Mar—12
conducted walnut program workshop (Ark.). Oct—8
conservation help for units of government. Feb—5
cooperative efforts with ARS in snow-melt runoff forecasts (Idaho). Jan—7
district conservationist assists gypsum company (Tex.) in revegating scars of quarry mining. July—10
Elsberry Plant Materials Center test native prairie grasses in Iowa. July—5
engineers and soil and water specialists help farmers design, adapt, and use the most suitable irrigation methods. June—11
environmental responsibilities to natural areas. Apr—9
feedlot waste control system (Nebr.). Sept—11
flood plains and flood hazard studies. May—4
furnishes soils information and developed improved strains of native New Mexico plants to help handicapped people. July—8
helping to create or restore trout habitat. Jan—12
helping with drainage problem (Miss.). Oct—16
helps airport develop action plan (Ohio). Jan—18
helps establish outdoor learning center (Iowa). Apr—11
helps in developing nature study area (Colo.). Aug—10
helps in selection of sites and design of ponds. May—13
helps local people with land use problems. July—22
helps NACD in recreation inventory. Apr—20
helps power company in natural resources management and maintenance problems (W. Va.). Dec—7
helps tree farmer with management plan (La.). Jan—21
helps with channel improvement in Texas neighborhood. Dec—14
helps with project to "save the dunes" (Me.). June—6
helps with soil survey information and onsite advise for archery golf course (Ohio). July—12
landfill assistance (N.C.). Dec—19
locally-based technicians help with conservation plan to produce more, protect more. Apr—13
participation in Boy Scout Jamboree. Nov—11
planning assistance on flood problems (N. Mex.). Dec—16
played key part in replanting Colorado range. Apr—16
prepared work plan for watershed project (Ohio). Dec—18
provided soil reports and helped with onsite inventories at school sites (W. Va.). Sept—20
provides soil survey map and other data to develop

suitable program for surface-mined land (Ill.) Nov—6
range site descriptions (Colo.). May—16
reimbursable agreement with FRA (Colo.) high speed test center. June—17
rural development (La.). Dec—10
satellite maps of the U.S. Dec—12
small watershed projects (Miss.). May—9
soils and engineering workshop aids Florida subdivision design. June—6
soil scientist inventories soils from air (Vt.). Jan—4
soil survey data and erosion control information supplied to ski area (N.H.). Jan—16
sponsors soils tour (Ariz.). Dec—15
summary of activities. Feb—4
supplies information and soil survey data (N.J.). July—19
technical assistance to Lubbock Christian College (Tex.). Apr—17
10-year agreement with National Park Service to study relict areas. June—8
with soil survey and help in installing terrace system aids cannery with waste disposal problem (Mich.). Sept—15

Women at work—Outdoors. June—9
work on the land helped reduce flood damage (Miss.). May—8
worked with coal producer in establishing grasses on spoil banks (Okla.). Jan—8
works with students (La.) on erosion problem. July—14
Statement on land-use policy. Secretary of Agriculture, Earl L. Butz. Dec—21
Steele, William T.: Soil data and sewage disposal. With Barry Stryker; Feb—20
STRIP-MINING—
aggressive steps to minimize environmental effects (Okla.). Jan—8
reclamation in (Ill.). Sept—4
Stryker, Barry: *Soil data and sewage disposal.* With William T. Steele. Feb—20.
Stuart, Wilfred J.: *Shelter for golden eagles.* Mar—17
Studying soil-plant relationships in Zion. Vear L. Mortensen and Lamar R. Mason. June—8
Sugar cane farming (La.). Apr—6
Surveying and monitoring services of SCS-FY-1973. Feb—10
Sweep of sage or a sea of grass. Dan S. Budd. Oct—20

Taking a shot at archery golf. Gordon C. Postle. July—12
TENNESSEE—
nature trail teaching aid for Dodson Elementary School students. Aug—16
stock trout streams. Jan—14
TERRACES—
and waterways control runoff and feed cattle (Nebr.). Dec—8
and waterways on cropland (Kans.). Oct—18
for flood control. Bruce Kidman. Dec—16
no problem. John M. Cross. Dec—8
prevented estimated $50,000 floodwater runoff damages (N. Mex.). Dec—17
tile outlet terrace solves water-hauling chore (Iowa). May—14
TEXAS—
Chocolate, Little Chocolate, and Lynn Bayou Channel Improvement Project. Dec—14
conservation treatment for airport. Sept—12
Deaf Smith Elementary School outdoor classroom. Aug—6
feedlot runoff pollution on college facility. Apr—17
odorless feedlot. Sept—8
outdoor classrooms goal of school system. Aug—20
pattern brush control for livestock and wildlife. Mar—12
range reclamation. Apr—10
revegating of quarry areas. July—10
Water, water everywhere. Feb—20
wide variety of outdoor conservation activities planned in school system. Aug—7
They're taming a panther. Robert L. Harryman and Dale Mitchell. May—10
Thinking thin. Richard S. Bainbridge. Oct—10
Thompson, Richard L.: *Clean-up of a lake.* June—18
Through an open door. Helen Patterson. Aug—16
Tidwell, R. D.: *Water, water everywhere.* Feb—21
Timely takeoff with RC&D. Neal C. Berry. Jan—18
Tooke, Winston D.: *Duskies by the sea.* Mar—10
TREE(S)—
American chestnut. Oct—13
Arkansas: trees no crowd. Oct—8
environmental forestry. Nov—8
Tree farm revisited. Carrow T. Prout. Oct—4
farming is good business. Benny Dobson. Jan—20
honeysuckle in windbreak attracts wildlife. Apr—19
ponderosa pine, green ash, honeylocust, hackberry, and eastern redcedar planted for cattle windbreaks (Colo.). Apr—19
Shadow cast by trees. Oct—2
thinning—community action project (Wash.). Oct—10
Troops, trout, and Trout Unlimited. Vincent J. Price. Jan—12
Tropical plants booklet goes worldwide. Gordon S. Smith. June—20
Trout Unlimited, chapters organized to restore or create trout habitat. Jan—12
Trump, Fred: *A winner picks a winner.* Oct—18

U.S. Army (Volunteers) works for stream improvement for trout. Jan—14
U.S. Coast Guard—
eroded cliffs at Paukaa, Hawaii. July—9
United States Gypsum Company, New Braunfels, Tex., turns scarred quarry green. July—10
Use of Land: A Citizens' Policy Guide to Urban Growth. Edited by William K. Reilly, reviewed by Warren T. Zitzmann. Jan—23
UTAH—
develops school grounds as recreational and environmental education areas. July—11
results of a 10-year study of soil-plant relationships used in Zion National Park. June—8

VERMONT—
flying soil surveyor compiles basic mapping data. Jan—4

Soil data and sewage disposal. Feb—20
VIRGIN ISLANDS—
Environmental Protection Act. July—16
Tropical plants booklet. June—20

Wallace, Barry: *Wildlife bonanza.* With Leon Fager. Mar—19
Warren, Gene—
Center of rural excellence. Dec—10
Community fights erosion. July—14
Family sticks to the land. Apr—6
WASHINGTON—
landowners work to protect wildlife. Mar—18
Thinking thin. Oct—10
Water, A Primer. Luna B. Leopold, reviewed by Eugene C. Buie. July—22
Water on every pasture. Jerry D. Schwien. Nov—15
Water, water everywhere. R. D. Tidwell. Feb—21
WATERSHED(S)—
Central Sonoma Watershed (Calif.). May—6
Central Sonoma Watershed Project. June—20
dam provides flood protection and water supply (Ohio). Dec—18
fish protection. May—6
Genegantslet Creek Watershed pools for trout. May—7
High Pine Creek Project (Ala.). Dec—5
Hightower Creek Watershed (Ga.). May—7
Montpelier Creek Reservoir byproduct of a PL-566 small watershed project. May—20
Panther Creek Watershed Project (Mo.). May—10
projects including only land treatment and land use regulations. May—5
projects kept floodwaters within banks. May—9
protection and flood prevention FY-1973 SCS assistance. Feb—6
protection project makes it—a living creek. Gordon S. Smith. Jan—10
Rushcreek Watershed Project (Ohio). Dec—18
Skipanon River Watershed (Oreg.). May—6
systems of lakes and subsurface drainage system applied to expanding environment of Florida subdivision. June—7
Twin Parks Watershed (Wisc.). May—7
Upper Blue River Watershed (Ind.). May—6
Weatherman, Philip R.: *Don't forget esthetic values.* Jan—22
Welcome Wagon for wildlife. Ernie Busek. Mar—18
Welsh, Gerald B.: *Diagnosing the Great Lakes.* July—18
Wengrzynek, Robert: *Maine's way of maintaining her natural areas.* With Herbert Hartman. Feb—16
Werchan, Leroy E.: *Growing grass on rock.* July—10
WEST VIRGINIA—
avoids school site problems. Sept—20
reclaims mined area for recreation. May—11
transmission line rights-of-way landscape treatment. Dec—7
tree farm. Oct—4
Wetlands and wildlife and weather. Kenneth E. Grant. Mar—2
What? May—20
When Old Man River Raged. Rose Fleming. May—8
Where it's at. Kenneth E. Grant. July—2
Whitaker, Gene. A.: *Prefabs for Phoebes and Barn Swallows.* July—6
Why Natural Areas are important. John Humke. Apr—8
WILDLIFE—
Beavers structural works. May—8
bonanza. Leon Fager and Barry Wallace. Mar—19
Colorado elk. Apr—16
Dusky seaside sparrow (Fla.). Mar—10
fish conservation (Ky.). Mar—14
fish protection in watershed projects. May—6
freshwater mollusk or mussel (N.C.). Mar—16
golden eagles (Nebr.). Mar—17
in your yard: to enjoy and photograph. Robert O. Koerner. Mar—20
manmade nesting structures for barn swallows and phoebes. July—6
Prescribed burning improves big game range. Mar—8
protection for Kirtland warbler (Mich.). Mar—6
Protection of rare and endangered species. Mar—4
refuge in rural development plans (La.). Dec—11
Society advice utilized in dunes restoration (Me.). June—5
Trout habitat improvement projects. Jan—12
Wetlands and wildlife and weather. Mar—2
Withrow Project (Wash.). Mar—18
Williams, Christopher: *Soils tour.* Dec—15
Willing to learn and willing to do. Edgar F. Baumann. Dec—20
Windbreaks for beefsteaks. John M. Cross. Apr—18
Winner picks a winner. Fred Trump. Oct—18
Women at work—Outdoors. John Cross. June—9
WOODLAND(S)—
area set up in outdoor learning center (Iowa). Apr—11
Arkansas' youth learns practical lesson in woodland conservation. May—15
environmental forestry. Nov—8
FY-1973 accomplishments. Feb—10
Tree farm revisited (W. Va.). Oct—4
Tree farming is good business (La.). Jan—20
Woody plants for Maryland highways. H. W. Everett, John A. Dickerson, and J. H. Kimmons. Feb—18
Working with nature in flood plains. William B. Davey. May—4
Wright, Joe E.: *Experiences unlimited.* Aug—18
WYOMING—
Lake Viva Naughton clean-up. June—18
return to grass on sagebrush covered slopes. Oct—20

YOUTH—
junior board (Oreg.) valuable resource. Dec—20
participation of Arkansas youth in conservation work and planning. May—15

Zitzmann, Warren T., review of *The Use of Land: A Citizens' Policy Guide to Urban Growth.* Jan—23

☆U.S. GOVERNMENT PRINTING OFFICE: 1975 O—573-925